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Technology Assessment Programmes

Summaries of Recent Completions and Current Work

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September 1985

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Office of Technology Assessment

Congressional Board of the 99th Congress

Senate

House

Advisory Council

Director

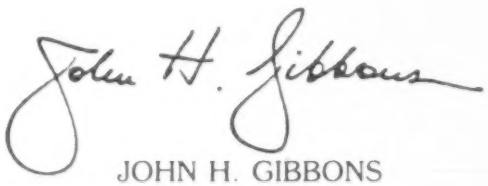
Preface

This booklet is designed to provide Members of Congress and their staffs with summaries of current and recently completed work.

The projected publication dates are estimates because schedules must be flexible to allow for uncertainties inherent in research, and because OTA must frequently shift its priorities to match changing congressional needs.

Legislative deadlines often require OTA to release specific information from an assessment before completion of the project. Frequently this information is conveyed through a staff briefing, testimony, or a technical memorandum.

We update this booklet periodically and welcome your comments on its value. For additional copies of this booklet or information on other OTA publications, please contact our Publishing Office (202) 224-8996.



JOHN H. GIBBONS
Director

Office of Technology Assessment (OTA)

OTA is a nonpartisan analytical support agency that serves the United States Congress by providing objective analyses of major public policy issues related to scientific and technological change. Governed by a bipartisan, bicameral Congressional Technology Assessment Board (TAB), OTA provides a variety of services to the Senate and House on a broad range of issues. Services include testimony, briefings, and interim documents such as Technical Memoranda and Background Papers on major assessments. OTA makes technical findings, identifies and describes options, but does not advocate particular policies.

OTA's multidisciplinary staff plans, directs, and drafts all assessments. It draws extensively on the broad technical and professional resources of the private sector, including the universities, research organizations, industry, and public interest groups.

Categories of Documents Issued by OTA

OTA Reports are the principal documentation of formal assessment projects. These projects are approved in advance by the Technology Assessment Board. At the conclusion of a project, the Board has the opportunity to review the report but its release does not necessarily imply endorsement of the results by the Board or its individual members.

OTA Technical Memoranda are issued on specific subjects analyzed in recent OTA reports or in projects presently in process at OTA. They are issued at the request of committees or Members of Congress who are engaged in committee legislative actions.

OTA Background Papers, Case Studies, and Workshop Proceedings are documents that contain information that supplements formal OTA assessments or is an outcome of internal exploratory planning and evaluation. The material is usually not of immediate policy interest such as is contained in an OTA Report or Technical Memorandum, nor does it present options for Congress to consider.

Assessment Requests and Approvals

According to the OTA act, requests for OTA assessments may be made by the chairman of any congressional committee acting for himself, or at the request of a ranking minority member or a majority of the committee members; by the Board; or by the OTA Director in consultation with the Board.

The Board decides whether or not OTA will undertake a requested assessment. First, the OTA staff analyzes the request to determine what resources and time it might require and what modifications it might need to suit OTA's resources and congressional needs. The staff then presents a formal proposal to the Board, who make the final decision.

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Projects described in this booklet are presented in various forms—completed, in progress, and ongoing. Keywords are listed and provided for a quick and easy reference to descriptions; the form of the OTA document is given in parentheses following each title: Report (R), Technical Memorandum (TM), Background Paper (BP), Case Study (CS), Special Report (SR), and Workshop Proceedings (WP).

Summaries (when stated as available) can be obtained by calling (202) 224-8996.

Full reports are provided to Members and their staff for congressional use. Others interested in the full reports can purchase them from the U.S. Government Printing Office or through the National Technical Information Service. Refer to the current OTA Publications List (OTA-P-58) or call OTA's Publications Office (224-8996) for ordering information.

Technology and the American Economic Transition (R)

Manufacturing
Employment
Economic growth

New technologies, rapid shifts in the price of energy and other critical commodities, sharp increases in trade (resulting in large part from the successful postwar reconstruction of the European and Japanese economies), and an unprecedented increase in the number of young people and women in the work force may lead to fundamental changes in the structure of the U.S. economy. We have already witnessed rapid growth in new fields (particularly those involving the processing and transmission of information) while many of the stalwarts of the American economy have not performed as well as expected. Declines in manufacturing employment have accompanied rapid growth in business service employment. Fluctuations in productivity have become increasingly difficult to explain. The analysis conducted for this project will describe how effects of technology can be disentangled from the other forces acting to change the economy. Instead of attempting to forecast the changes that may occur, it will provide a description of the choices that will be available and the potential consequences of decisions that must be made. In particular, it will examine national policy decisions that may be needed to exploit the opportunities technology can offer and protect the country from potential adverse consequences.

Project Director: Henry Kelly 226-3960

Estimated publication date: Fall 1985. Interim publications:
"International Competitiveness of U.S. Agriculture" (TM). Project Director: Ken Cook 226-3967
"New Construction Technologies" (TM). Project Director: Bob Gold 226-3966
"Leisure Industries" (TM). Project Director: Robert Howard 226-3964

New Electric Power Technologies: Problems and Prospects for the 1990s (R)

Powerplants
Utility producers
Tax credits

Electric utilities are more constrained in their choice of generating technologies than they were a decade ago when they engaged in a massive construction program of large powerplants. At present, faced with uncertainties in electricity demand forecasts, utilities are avoiding commitments to complex, long lead-time large powerplants. The Federal Government has directly and indirectly encouraged the development of a series of new technologies that have in common the small size and short lead-times which in theory offer greater flexibility to utilities. Such new technologies include: utility-controlled load management, fuel cells, advanced coal- and gas-combustion technologies, photovoltaics, solar thermal power, wind, and geothermal.

This report examines the current and projected cost and performance of such technologies, and evaluates alternative options for accelerating their availability, which could be a prudent way to give utilities more supply choices in the 1990s. Among the options considered are an increased or refocused Federal role in research, development, and demonstration activities; cooperative efforts among utilities, industry, utility commissions, and government; and a number of revisions to existing Federal legislation.

Project Director: Peter Blair 226-2133

Published: July 1985. Summary available

Nuclear Power in an Age of Uncertainty (R)

Atomic powerplants
Nuclear reactors

The nuclear reactor manufacturing industry is facing a period of extreme uncertainty. There have been no reactor orders since 1978, and it is quite possible that none will be placed in time to keep existing design and manufacturing capabilities intact. The principal reason has been the decline in electricity demand growth that has greatly reduced the near-term need for new generating capacity. Other factors and perceptions about nuclear power—e.g., safety concerns, costs, reliability questions—have also contributed to the industry's difficulties. In order for the nuclear option to be available, and to be acceptable to the utilities, regulators, and the public, substantial technical and institutional changes may be needed.

This assessment examines the major technical considerations about the future of conventional nuclear power and how these technologies can affect economic, regulatory, and institutional issues (e.g., Government and industry responsibilities) that govern that option.

Technical issues studied include potential improvements to existing reactors such as higher fuel burn-up and increased reliability; reoptimized and standardized light water reactors; and different reactor types such as HTGR or CANDU reactors. The consequences of these possible changes on licensing, reactor costs, safety, industrial structure, and public perception are examined.

Project Director: Alan Crane 226-2105.

Published: February 1984. Summary available.

Industrial and Commercial Cogeneration (R)

Electric power production
Cogeneration

The need to reduce U.S. dependence on petroleum as a primary fuel in the industrial, commercial, and electric utility sectors has helped spark a resurgence of interest in cogeneration—the combined production of both electric power and heat or steam in one technological process. Because the total amount of fuel needed to produce both power and heat/steam in a cogenerator is less than the total fuel needed to produce the same amount of power and heat/steam in separate technologies (e.g., a powerplant and an industrial boiler), cogenerators can contribute to our Nation's efforts to use fuel more efficiently.

This assessment examines the role that cogenerators could play in providing electric and thermal energy for industrial and commercial facilities while distributing electricity to the utility grid. It reviews the economic, environmental, social, and institutional consequences of cogeneration, with a special emphasis on the potential effects on the electric utility industry's planning and operations. Finally, the study analyzes policy options that Congress may wish to consider in addressing the issues about the development of cogeneration systems.

Project Director: Jenifer Robison 226-2134

Published: February 1983. Summary available.

U.S. Natural Gas Availability: Gas Supply Through the Year 2000 (R)

Natural gas
Energy production
Fossil fuels
Petroleum engineering

In the past few years there has been a change in the outlook about the potential for natural gas production in the Lower 48 States. Recent optimistic projections by some groups have stimulated efforts to revise current natural gas policy so that natural gas can play a bigger role in reducing this country's oil imports. There remains, however, considerable uncertainty about how much the United States can rely on natural gas, which is tempering this optimism. This assessment is designed to help determine domestic (Lower 48 States) natural gas availability over the next few decades, and to help understand the factors that affect this availability. The OTA assessment: 1) analyzes the key technical and physical parameters that determine the resource base and future production rates of all categories of natural gas; 2) critically reviews current estimates of the resource base, and estimates the potential production rates of natural gas; and 3) analyzes the uncertainties in estimates of resources and production rates, and identifies those uncertainties that may be reduced with additional R&D.

Project Director: Steve Plotkin 226-2110

Published: February 1985. Summary available. Interim publication "U.S. Natural Gas Availability: Conventional Gas Supply Through the Year 2000" (TM), published September 1983.

U.S. Vulnerability to an Oil Import Curtailment (R)

Energy shortages
Energy industries
Fuel substitution

Over the next decade, it is possible that the Nation will experience a disruption in imported oil of a level that will exceed the capabilities of the Strategic Petroleum Reserve and seriously affect the economy.

This assessment examines the opportunities and problems that characterize various technical responses that could supplement the Strate-

gic Petroleum Reserve to meet such an interruption. The objective is to determine what available resources might be expanded, the technical limitations for fuel substitution and switching, the physical constraints of stockpiling resources, and the impacts of accelerating the use of these technologies. Technologies to be considered include enhanced oil recovery; adapting industrial boilers to dual-fuel capacity; biomass production; high-voltage transmission; hydro; wind; direct solar; vehicle retrofits; photovoltaics; retrofitting building envelopes and heating/cooling systems; retrofitting vehicles to improve mileage efficiency; and switching capacity of petroleum refineries.

Project Director: Tom Bull 226-2127

Published: September 1984. Summary available.

Western Surface Coal Mine Reclamation (R)

Coal reserves
Mining engineering

In the 7 years since enactment of the Surface Mining Control and Reclamation Act (SMCRA), coal companies have made significant improvements in reclamation technologies and methodologies, and the prospects for the success of surface mine reclamation have brightened. Yet recent analyses have raised concerns about the use of data, models, and lease stipulations in the implementation of SMCRA. This study will examine: 1) the methods for predicting and evaluating the success of reclamation practices, including an analysis of the levels and kinds of uncertainty in those methods and in the monitoring and other data that support them; 2) the relation between pre-leasing and post-leasing technological or methodological requirements for environmental protection, including an analysis of the fate of lease stipulations intended to implement the environmental protection requirements of the Federal coal leasing program; 3) the encouragement given to the development and use of innovative and emerging reclamation techniques; and 4) the status of monitoring and research on mined land reclamation in the West, and how monitoring and other data are being used to support the activities in 1-3. The assessment will identify the uncertainties that remain to be resolved before judgments about the long-term success of Western surface coal mine reclamation can be made. It will examine technical and policy options for improving the prospects for successful reclamation of Western coal lands.

This assessment also will examine the success of special provisions in SMCRA relating to Prime Farmlands. This analysis will be published separately as a staff paper.

Project Director: Jenifer Robison 226-2134

Estimated publication date: Fall 1985

High-Technology Ceramics and Polymer Composites (R)

High-technology ceramics and composites
Manufacturing productivity

Development and use of advanced materials such as high performance ceramics and polymer composites promise dramatic changes in many aspects of our economy. The unique properties and design features of these materials provide the opportunity for greatly increased performance in many products in use today, enhanced manufacturing

productivity, and new types of products. Composites used as structural members in aircraft and ceramics in machine tool bits already have demonstrated some of these large performance gains. The promise of these materials has caused other nations to embark on major development programs. This nation's ability to maintain long-term economic growth and remain competitive will depend to a large extent on how well we take advantage of the opportunities presented by these materials. To do so, however, requires that many technical problems and non-technical barriers be overcome.

This assessment will better define the many opportunities for high-technology ceramics and polymer composites over the next 15 to 25 years. It will determine the principal technical and related problems that need to be overcome if timely expansion of the commercial use of these materials is to take place. Finally, the study will analyze the broad implications of these high-technology materials to future U.S. economic growth and competitiveness.

Project Director: Tom Bull 226-2127

Estimated publication date: Spring 1987. Interim publication: "Future Opportunities for Advanced Materials" (TM)

Industry, Technology, & Employment (226-2269)

Strategic Materials: Technologies to Reduce U.S. Import Vulnerability (R)

Strategic materials
Minerals and materials
Foreign economic relations

The United States imports well over $1 billion worth of chromium, cobalt, manganese, and platinum group metals annually. Many of the uses of these metals are essential to the industrial economy and the national defense. The United States imports virtually all of its requirements for these metals; their production is highly concentrated in two regions of the world: the Soviet Union and southern Africa. The potential for interruption of supplies from these sources has heightened congressional interest in alternatives to continued import dependence.

This study assesses the technical alternatives to continued reliance on southern Africa and the U.S.S.R. for strategic metals. It identifies promising opportunities for domestic and diversified foreign production and for conservation and substitution for each metal. The assessment reviews technical, economic, and institutional barriers to the implementation of the alternatives and analyzes governmental options to overcome those barriers.

Project Director: Lance Antrim 226-2206

Published: May 1985. Summary available.

Superfund Strategy (R)

Hazardous waste management
Toxic substances pollution
Landfills

Mismanagement of hazardous wastes—both past and present—threatens human health and the environment and is expensive for our society. A start has been made in developing cleanup technologies for uncontrolled sites and in averting problems by effective management of new hazardous wastes. Nevertheless, existing technologies are inadequate for some cleanup goals; current economic commitments are dwarfed by the magnitude of the problem; more and more uncontrolled waste sites may need attention, perhaps even some already cleaned up; and institutional responses to known problems have often been called slow. The previous OTA study (*Technologies and Management Strategies for Hazardous Waste Control*) completed in March 1983 and the OTA case study on Love Canal completed in June 1983 addressed these issues in a preliminary way.

This assessment: 1) examines future Superfund needs and how permanent cleanups can be accomplished in a cost-effective manner for diverse types of sites; 2) describes the interactions among many components of the complex Superfund system; and 3) analyzes the consequences of pursuing different strategies for implementing the program. The study brings together a great deal of information on what can be learned from the initial Superfund program in order to improve it. In particular, it focuses on the choice between continuing and improving the current program and adopting a new strategy on the basis of improved information. Such a new strategy has been defined and analyzed by OTA in considerable detail to provide Congress with an understanding of critical policy trade-offs.

Project Director: Joel Hirschhorn 226-2089

Published: April 1985. Summary available.

Technologies and Management Strategies for Hazardous Waste Control (R)

Hazardous waste disposal
Waste products

Uncontrolled and careless disposal of industrial waste became a national concern in the mid and late 1970s. It became evident at many waste sites that mismanagement and indiscriminate dumping of waste were causing harmful substances to be released into the land, water, and air. It also became increasingly clear that even well-intentioned and currently accepted waste management practices, particularly the use of landfills and other means of land disposal, might still constitute substantial threats through the slow leakage of waste constituents or leachate through the soil and into the groundwater, which is a source of drinking water for many communities.

This report focuses on the technological options for managing hazardous waste at operating facilities and the technical adequacy of the Federal regulatory program. It identifies four policy options—beyond maintaining the current Federal program—which could form the basis for an immediate and comprehensive approach to protecting human health and the environment from the dangers posed by mismanagement of hazardous waste. One near-term option addresses the means to improve the technical effectiveness of the current regulatory structure. The other near-term option provides a nonregulatory or market approach to achieving a number of desired goals. Both of these options are compatible with the two longer term options, one of which deals with introducing waste and facility classification into the regulatory structure, and the other which focuses on achieving greater integration of Federal programs, agencies, and statutes concerned with hazardous waste.

Project Director: Joel Hirschhorn 226-2089

Published: March 1983. Summary available. Interim publications:
"Habitability of the Love Canal Area" (TM), published June 1983;
"Nonnuclear Industrial Wastes: Classifying for Hazards Management" (TM), published November 1981.

Wood Use: U.S. Competitiveness and Technology (R)

Wood
Forest and forestry

The United States has 483 million acres of commercial forestland; over 15 billion cubic feet of timber were harvested in 1980. However, the United States still imports nearly 30 percent of its softwood lumber, approximately half of its wood pulp, and significant quantities of plywood. The forest industry and Government experts state that with new technologies for improved forestry practices, better wood utilization, and new product development the United States could become at least independent of wood imports and possibly a net exporter of wood.

This assessment surveys the contribution of the forest products industry to the U.S. economy, the ability of the industry and the U.S. forest resource to satisfy expected domestic demands for wood, the competitiveness of U.S. forest products on world markets, and the role of technology in stretching the U.S. forest resource and providing products that satisfy domestic needs as well as international markets. It discusses the relationship of various levels of government and the forest products industry in providing for future wood products needs. Finally, it presents policy options designed to enhance the advantages of U.S.

producers in international markets, to provide research and development in forest management, environmental effects of forestry, and wood materials science, and to improve the productivity of U.S. forests.

Project Director: James Curlin 226-2077

Published: August 1983. Summary available

Technology and Structural Unemployment: Retraining Adult Displaced Workers (R)

Unemployment
Retraining

In an era of rapid technological and economic change, retraining of adult workers may become more important to combat worker displacement, to meet the needs of an aging work force, and to provide the U.S. economy with skilled workers. Displacement arises from permanent structural changes in American industry, and is a result of several factors, including changing technologies in both existing and new industries, import penetration, loss of export markets, offshore production, and domestic demographic changes. Many observers expect displacement to increase during the coming decade, despite economic recovery. Properly focused, retraining might help some displaced workers to find rewarding employment, even as the availability of skilled workers may help to remove one constraint to growth of competitive industries.

The assessment will focus on technologies, policies, and methods of retraining and reemploying displaced workers; and will examine the impact of retraining on structural unemployment and on the international competitiveness of U.S. industries. Because the number of jobs created in the next decade may also be less than the number of people desiring jobs, strategies other than retraining may also be necessary to combat umemployment. The study will provide an overview of such strategies, and their possible impacts on the international competitiveness of U.S. industry.

Project Director: Julie Gorte 226-2205

Estimated publication date: Fall 1985

International Competition in the Service Industries (R)

Employment
Technology transfer

The services, producers of intangibles or invisibles, have become mainstays of the U.S. economy, both in terms of domestic employment and foreign sales. Many are driven by new technologies. The U.S. balance of payments position depends heavily on income from foreign sales of intangibles to counterbalance, if only in part, merchandise deficits. Exports to technology-intensive manufactures—commercial aircraft, power generating equipment, electronic systems—are frequently tied to training and maintenance contracts. New developments in many of the service industries stem directly from technical advances. Increasingly, the Western European nations and Japan offer strong competition in international markets for technologically based services.

The analytical approach in this assessment will be based on that developed in past OTA studies of competitiveness: three to five service industries will be selected for detailed analysis based on business strategies as affected by technological developments, industrial structure, and government policies.

Project Director: John Alic 226-2012

Estimated publication date: Summer 1986

International Security & Commerce (226-2026)

International Cooperation and Competition in Civilian Space Activities (R)

Space activities
Technology transfer
Telecommunications

Over the last decade, Europe and Japan have developed substantial space programs and are now building space systems that compete commercially with U.S. space technology. Although they have markedly increased their ability to compete with the United States, at the same time these countries have also become more capable partners for cooperative ventures in space science and space applications. This report examines the consequences of these developments, both for the U.S. space program and for the private sector space systems. It explores the status of space transportation, satellite telecommunications, remote sensing from space, materials processing in space, and space science, and analyzes a range of cooperative and competitive policy options for addressing the issues raised in these sectors. Further, the report explores the role of the developing countries in global space activities and develops options for enhancing their use of space technology.

Project Director: Ray Williamson 226-2209

Published: July 1985. Summary available. Interim publications:
"Remote Sensing and the Private Sector: Issues for Discussion" (TM), published March 1984;
"UNISPACE '82: A Context for International Cooperation and Competition" (TM), published March 1983.

Technology Transfer to the Middle East (R)

Technology transfer
Middle East
Developing countries

During the last decade, the Middle East has been in the world's fastest growing market, one which West European, Asian, and Communist as well as U.S. enterprises have all sought to penetrate. The oil-rich nations have purchased the most advanced equipment and technology, both civilian and military. Technology transfers on such a large scale may have important implications for both the recipient and supplier nations. This study assesses the commercial and strategic ramifications of transfers of advanced Western technologies (in sectors such as operation and maintenance of aircraft, petrochemical production facilities, nuclear powerplants, communications, and service systems) in order to provide a foundation for U.S. policy development.

The study assesses past experience with technology transfers to the Middle East, investigates the capability of these nations to effectively absorb advanced Western technology, evaluates the likelihood of continued and expanding transfers in the years ahead, and discusses the implications for American foreign and international economic policy.

Project Director: Martha Harris 226-2016

Published: September 1984. Summary available.

Technology Transfer to China (R)

Technology transfer
Telecommunications
Computers

The People's Republic of China (PRC) is introducing major changes as it rapidly modernizes its economic system and seeks improved global relationships. Imports of technology and scientific expertise and the encouragement of foreign investment are key elements. This presents eco-

nomic and strategic opportunities and risks for the United States. China could become a major market for U.S. exports, and technology transfer could enhance economic growth for both countries. Technology transfer could also be a major factor in improving relations and strengthening China's role in Asia. However, if relations deteriorate between the United States and the PRC, we may regret having provided technology that would strengthen their military. Another concern is that China may expand commercially to become a competitor in world markets. This assessment will examine the role of imported science and technology in the plans of the PRC; the technology the United States and other nations can supply; the impacts of policy on these transfers; and the security and commercial risks involved.

Project Director: Alan Crane 226-2105

Estimated publication date: Winter 1986-87. Interim publication: "Energy Technology Transfers to China" (TM), published September 1985.

Technology and East-West Trade (R)

Technology transfer
National security
East-West trade
Export controls

Trade and commerce between nations is a necessary, if not sufficient, requisite for achieving peaceful relationships. On the other hand, trade with a potential adversary will inevitably, to some extent, strengthen the economy and the military capability of the trading partner. It is in the context of this dilemma that debates over the value and wisdom of selling U.S. goods and technology to the Communist world take place. This study was undertaken to help provide Congess with the capability to address the complex issues raised by this trade, including the extent to which international trade in high technology endangers the national security of the United States. It addresses the controversies that surround the issue of East-West trade and technology transfer, i.e., the costs and benefits of the United States' selling technology to and expanding its commercial relations with the Soviet Union, Eastern Europe, and the People's Republic of China.

Key Contact: Peter Sharfman 226-2020.

Published: November 1979. Follow on publication: "Technology and East-West Trade: An Update" (R), published May 1983.

Ballistic Missile Defense Technologies
Report I: Ballistic Missile Defense Technologies (R)
Report II: Anti-Satellite Weapons, Countermeasures, and Arms Control (R)

Ballistic missile defense
Anti-satellite weapons
Arms control

The Administrations's "Strategic Defense Initiative" (SDI) is an accelerated program of research and technology development for ballistic missile defense (BMD) systems, with the stated ultimate goal of "eliminating the threat posed by nuclear ballistic missiles. *Ballistic Missile Defense Technologies* examines the potential roles of various levels of BMD deployments in U.S. national defense strategy and the potential implications of BMD for strategic stability and arms control. The report explains and assesses the status of the new technologies applicable to BMD. Finally, it describes the character and implications of a range of alternative research programs Congress may wish to consider.

The topics of *Anti-satellite Weapons, Countermeasures, and Arms Control* have important implications for research on and deployment

of space-based BMD systems. It examines various current and potential anti-satellite weapons and countermeasures and discusses a range of potential arms control regimes.

Project Director: Tom Karas 226-2014

Published: September 1985. Summaries available.

Technology and Soviet Energy Availability (R)

Petroleum industry
Coal mines and mining
Atomic power
Electric power
Energy supplies and development
Technology transfer

This assessment addresses in detail the significance of American petroleum equipment and technology to the U.S.S.R. and the resulting options for U.S. policy. It examines the problems and opportunities that confront the U.S.S.R. in its five primary energy industries—oil, gas, coal, nuclear, and electric power. It discusses plausible prospects for these industries in the next 10 years; identifies the equipment and technology most important to the U.S.S.R. in these areas; evaluates the extent to which the United States is the sole or preferred supplier of such items; and analyzes the implications for both the entire Soviet bloc and the Western alliance of either providing or withholding Western equipment and technology.

Key Contact: Peter Sharfman 226-2020

Published: November 1981. Summary available.

The Effects of Nuclear War (R)

Atomic warfare
War casualties
Civil defense

Nuclear war is not a comfortable subject. Throughout all the variations, possibilities, and uncertainties that this study describes, one theme is constant—a nuclear war would be a catastrophe. A militarily plausible nuclear attack, even limited, could be expected to kill people and to inflict economic damage on a scale unprecedented in American experience; a large-scale nuclear exchange would be a calamity unprecedented in human history. The mind recoils from the effort to foresee the details of such a calamity, and from the careful explanation of the unavoidable uncertainties as to whether people would die from blast damage, from fallout radiation, or from starvation. But the fact remains that nuclear war is possible, and the possibility of nuclear war has formed part of the foundation of international politics, and of U.S. policy, ever since 1945.

This study examines what is known, and what is not known, about the likely consequences if efforts to deter and avoid nuclear war should fail. Those who deal with policy issues regarding nuclear weapons should know what such weapons can do, and the extent of the uncertainties about what such weapons might do.

Key Contact: Peter Sharfman 226-2020

Published: May 1979. Summary available.

International Competitiveness in Electronics (R)

Electronic industry
Computer industry

There is a growing concern that key U.S. industries are declining in their international competitive positions. The electronics industry is particularly significant because it occupies a strategic position as a technological driving force for other industries that use products like semiconductors and computers. The report assesses three sectors of this industry: consumer electronics (where the United States has suffered heavily from Japanese competition); semiconductors (where a strong U.S. position is under challenge); and computers (where the United States still appears to lead the world).

It focuses on those major contributors to the competitiveness of the electronics industry that could most readily be affected by U.S. Government policy. The study compares the United States, Japan, and (to a lesser extent) Western Europe with respect to the following major factors: 1) commercialization of research, development, and design; 2) manufacturing techniques and resources; 3) finance, including both private and public sources of funds; 4) human resources, both quantity and quality; and 5) governmental/industrial policies.

Project Director: John Alic 226-2012

Published: November 1983. Summary available.

Alternatives for Improving NATO's Defensive Response (R)

Conventional defense

Prominent among recent initiatives for improving NATO's conventional defense are the exploitation of emerging technologies—especially "smart" munitions—and the follow-on forces attack (FOFA) concept for interdicting Warsaw Pact forces that have not yet joined the offensive. The United States presently spends hundreds of millions of dollars annually on research on weapons and support systems for interdiction; eventual procurement could total hundreds of billions.

This OTA assessment will develop a comprehensive appraisal of the technical, military, and political opportunities and risks of using various technologies to implement the FOFA concept. It will assess current and advanced conventional weapons. The assessment will examine other issues such as aircraft and missile platforms and target acquisition, and identify and assess unsolved technical problems. Soviet doctrine will be reviewed to assess possible Soviet responses and the military value of alternative NATO interdiction technologies. Finally, the project will identify and assess a range of possible U.S. policy options for implementing FOFA.

Project Director: Alan Shaw 226-2018

Estimated publication date: Winter 1986-87.

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Biological Applications (226-2090)

Technology and Aging in America (R)

Aged
Technology and social problems
Functional capabilities
Chronic conditions
Living environment
Workplace
Long-term care
Telecommunications
Health promotion
Drugs/medication

This study focuses on the functional status of the elderly and the ways in which technology can assist them to maintain their independence and enhance their quality of life. Medical and health care technologies have led to increased longevity, which has been accompanied by rising prevalence of chronic diseases that impair functional ability. Therefore, this assessment focuses on technology and changes in: 1) health status, 2) health services, 3) the living environment, and 4) the workplace.

The report discusses the impact of five chronic conditions on the lives of those afflicted, potential health improvements from behaviors that may delay onset of chronic diseases, the need for increased biomedical research, and how telecommunications can foster self-health care. It also reviews the importance of medication for management of chronic impairments, the need for a coordinated approach to long-term care, appropriately developed supportive services, and improved technologies to assess health and functional status.

The report describes Federal programs that subsidize rental housing for the elderly and also new design standards that promote safety and improve the elderly's ability to be self-sufficient. The study also evaluates the impact of changes in workplace technology. Job security may be weakened in some industries, while in others technology can enhance job performance, safety, and security for older workers. Telecommunications are making the "electronic cottage" a reality and retraining of older workers would encourage continued employment or provide new job possibilities.

Project Director: Robert A. Harootyan 226-2090

Published: June 1985. Summary available. Follow-on publications:
"Technologies for Managing Urinary Incontinence" (CS), published July 1985.
"Management of Hearing Impairment in the Elderly" (BP), fall 1985.

Management of Hearing Impairment in the Elderly (BP)

Aged/elderly
Hearing impairment

About one-fourth of people over 65 and up to 40 percent of those over 75 have hearing impairments that interfere with understanding normal speech. Even these numbers may underestimate the prevalence of this problem because hearing impairment in the elderly is often undetected. Most hearing impairments of the elderly cannot be corrected with available medical or surgical treatments. Thus, the use of technologies that compensate for hearing impairments is often the most effective treatment. This OTA background paper describes the most common types and causes of hearing impairment in the elderly and reviews technologies such as hearing aids, assistive listening devices, signaling and telecommunications devices, and environmental design technologies that can be used to compensate for hearing loss.

Elderly people and their families are generally unaware of many of these technologies, and little information about their effectiveness is avail-

able to consumers. In addition, with the exception of hearing aids, the existing services delivery system does not promote access to available technologies. This background paper emphasizes the need for more public information about technologies that compensate for hearing loss and improved service delivery systems that are adapted to the characteristics of the elderly.

Project Director: Robert A. Harootyan 226-2090

Estimated publication date: Fall 1985

Impacts of Neuroscience (BP)

Neurology
Brain research
Neuroscience
Neurotoxicology
Bioethics
Nervous system

Neuroscience research has led to new treatments for major causes of death in both the developed world (cardiovascular disease and stroke), and developing nations (parasitic diseases), in addition to advancing knowledge about neurological and psychiatric disorders. In the United States, the aging of the population provides one of the strongest incentives for research on the nervous system, because of the burden of illness imposed by several mental and organic brain disorders that become increasingly common with age, such as depression, insomnia, and Alzheimer disease.

One of the most important motives driving neuroscience research is the desire for solutions to the ravages of brain diseases like Alzheimer disease. This background paper focuses on the status of basic neuroscience research, and investigates not only the current status and potential medical applications, but also includes broad social and ethical issues that might arise from such research. This background paper also looks at neurotoxicology. Toxic damage to the nervous system is emerging as an important area for public policies to protect the health of workers and members of the general population. Neurotoxicology is also growing rapidly as a scientific discipline.

Study Director: Robert Cook Deegan 226-2034

Published: March 1984

Life-Sustaining Technologies and the Elderly (R)

Chronic diseases
Aged/elderly
Surrogate decisionmaking
Patients' rights
Life support
Death and dying
Advance directives

Recent technological advances in the treatment of chronic disease and acute illness, combined with greater access to such care, make it possible to keep persons alive who might never have survived in the past. More older persons than ever before are surviving to age 75 and beyond. These advances have led to complex legal, ethical, and financial issues concerning the definition of death, appropriate use of life-sustaining technologies, quality of life, patients' rights, surrogate decisionmaking, and the allocation of Federal health care resources.

This assessment will: 1) classify types of life-sustaining technologies and describe their development; 2) evaluate the use of technologies in different situations and settings (e.g., end-stage renal dialysis, resuscitation, ventilation, nutritional support, etc.); 3) describe the elderly subpopulations that are affected; 4) review ethical problems such as patients' rights; 5) present data on attitudes toward use of life-sustaining

technologies; 6) review problems related to surrogate decisionmaking for the demented elderly; 7) evaluate Federal and State laws regarding patients' rights, surrogate decisionmaking, and advance directives; and 8) assess costs related to current and potential applications of life-sustaining technologies.

Project Director: Robert A. Harootyan 226-2090

Estimated publication date: Summer 1986. Interim publication: "Surrogate Decisionmaking on Behalf of Elderly Mentally Incompetent Patients" (BP), winter 1985-86.

Disorders Causing Dementia (R)

Dementia
Alzheimer disease
Aging/elderly
Medicaid
Long-term care
Biomedical research
Health

The economic, social, and health problems associated with disorders that cause deterioration of mental function (dementia) are growing rapidly. Current estimates of the cost of providing long-term care nationwide are approximately $30 billion annually for nursing homes and another $14 billion for other forms (1983); with $12 billion derived from Federal sources (Medicare, Medicaid, Veterans Administration, etc.). Disorders leading to dementia account for an estimated 30 to 50 percent of these costs. These figures, and the other costs associated with dementia (emotional distress among friends and family, costs of acute medical care, including diagnosis, and income lost due to the disease) threaten to rise rapidly as the proportion of very old people (over 80) in the population continues to increase much faster than other age groups.

This assessment will consider Federal policy relating to two major Federal functions: 1) support of basic research intended to provide treatment or means of prevention, and 2) financing and monitoring of long-term care for those who have dementia. The assessment will survey the status of basic biomedical research and health services research, and will evaluate the methods for providing long-term care of those who develop dementia. The assessment of long-term care will include discussion of various options: home care, day care, respite care, adoptive care, and domiciliary care, in addition to nursing home care. Particular attention will be focused on evaluating methods for optimizing care of demented patients in the various settings (including Federal and private responsibilities for financing quality assurance).

Project Director: Robert Cook-Deegan 226-2034

Estimated publication date: Fall 1986. Interim publication: "Surrogate Decisionmaking on Behalf of Elderly Mentally Incompetent Patients" (BP), winter 1985-86.

Surrogate Decisionmaking on Behalf of Elderly Mentally Incompetent Patients (BP)

Aging/elderly
Dementia
Bioethics
Health
Mental health

Current and projected increases in the number of elderly persons with progressive, irreversible dementias have led to a growing interest and concern over the problems and practices of surrogate decisionmaking. The background paper will be published as part of a joint effort of the 'Disorders Causing Dementia' and 'Life-Sustaining Technologies and the Elderly' assessments.

The paper will address such issues as determinants of mental competence, levels of competence, the process of identifying a surrogate, the transferring of decisionmaking power, ethical dilemmas in surrogate decisionmaking, limitations to surrogate decisionmaking powers, advance directives, conflicts of interest, commitment into nursing homes, and abuse of surrogate powers. The Background Paper will also analyze appellate court decisions relevant to critical care for the demented elderly in the following ways: the role of the courts in such decisions, and in determining competence and protecting patient autonomy; the right to refuse life-sustaining treatment; and the role of criminal law in cases of critical care for elderly incompetent patients.

Study Director: Teresa S. Myers 226-3882

Estimated publication date: Winter 1985-86

Commercial Biotechnology: An International Analysis (R)

Following the first successful directed insertion of foreign DNA in a host micro-organism in 1973, scientific researchers in the United States and other countries began to recognize the potential for directing the cellular machinery to develop new and improved products and processs in a wide diversity of industrial sectors. Potential applications of novel genetic techniques include the production of new drugs, food, and chemicals; the degradation of toxic wastes; and the improvement of agricultural products. Thus, these new techniques could have a major economic impact on industries throughout the world.

This report assesses 10 factors of importance in the competitive position of the United States with respect to Japan and four European countries believed to be the major competitors in the commercial development of "new biotechnology." Although the United States is currently the world leader, continuation of the initial preeminence of American companies in the commercialization of new biotechnology is not assured. The report identifies congressional policy options for improving U.S. competitiveness in new biotechnology.

- Biotechnology
- Drug industry
- Agricultural innovations
- Specialty and commodity chemicals
- Bioelectronics
- Finance and tax incentives
- Intellectual Property Law
- Antitrust Law
- University/industry relationships
- Government research
- Public perception
- Comparison with U.S. semiconductor industry
- Biotechnology firms
- Health, safety, environment regulation

Key Contact: Gretchen Kolsrud 226-2090

Published: January 1984. Summary available.

Impacts of Applied Genetics: Micro-Organisms, Plants, and Animals (R)

Genetic technologies will have a broad impact on the future. They may contribute to filling some of the most fundamental needs of mankind—from health care to supplies of food and energy. At the same time, they arouse concerns about their potential effects on the environment and the risks to health involved in basic and applied scientific research and development.

This report describes the potential and problems of applying the new genetic technologies to a range of major industries. It emphasizes the present state of the art because that is what defines the basis for the

- Genetic engineering
- Plant agriculture
- Animal agriculture
- Environmental uses
- Pharmaceutical industry
- Chemical industry
- Food industry
- Public perception

future applications. The report estimates the economic, environmental, and institutional impacts—where, when, and how some technologies might be applied and what some of the results might be.

Key Contact: Gretchen Kolsrud 226-2090

Published: April 1981. Summary available.

Human Gene Therapy (BP)

Genetic engineering
Human genetics
Genetics
Gene therapy
Biotechnology
Bioethics

Interest in human applications of recombinant DNA technology has been expressed by numerous scientific, medical, religious, civic, and government leaders. This background paper focuses on the imminent development of human gene therapy, emphasizing early medical applications. The governmental concerns related to human gene therapy, as for other medical technologies, will include protection of subjects involved in research and clinical treatment, ensuring safety and efficacy of the techniques in specific applications, and public discussion and education.

Human gene therapy, if it is approved for use, will first be performed on patients who have no better prospect for treatment, and who suffer from severe, rapidly fatal diseases caused by defective genes. Treatment will involve inserting copies of the normal gene into cells where the new gene can be used to produce proteins that correct a biochemical defect. Human gene therapy as currently envisioned would thus be applied to treat patients with specific rare genetic disease, and not as the tool of a eugenic social program intended to improve the human gene pool.

Study Director: Robert Cook-Deegan 226-2034

Published: December 1984

The Role of Genetic Testing in the Prevention of Occupational Disease (R)

Genetic testing
Occupational health
Legal issues

This report examines a technology that may be useful in reducing occupational disease, but also raises concerns about potential misuse. Genetic testing encompasses two major techniques—one (screening) that may be able to identify individual workers who are genetically at higher risk to disease, and another (monitoring) that may service as an early warning system that exposure to a hazardous agent in the workplace has occurred. The study examines the technology and its social implications. It evaluates the evidence supporting its claimed benefits, the extent of testing, and how the results have been used. The report identifies and discusses social issues, particularly of a legal and ethical nature.

Key Contact: Gretchen Kolsrud 226-2069

Published: April 1983. Summary available.

Reproductive Health Hazards in the Workplace (R)

Health hazards
Reproductive hazards
Sex discrimination
Workers' compensation
Regluation under OSHA and FIFRA
Chemical hazards
Biological hazards
Physical hazards
Radiation
Civil Rights Act

Although the extent to which workplace exposure to chemical, physcial, and biological agents may contribute to reproductive impairment is unknown, the level of reproductive impairment in the population is a significant public health concern. There is an obvious need for elucidating the causes in order to reduce the overall incidence of reproductive impairment. Policy decisions regarding the management of occupationally related reproductive risk must be made within the context of two Federal statutes: the Occupational Safety and Health Act, and the Civil Rights Act. These may be viewed as contradictory because steps taken to protect the health of the embryo/fetus may interfere with female workers' employment opportunities.

Toxic substances are unlikely to be regulated solely for their reproductive health effects because most agents that affect reproductive health have other health effects as well. To date, four health hazards—ionizing radiation, lead, ethylene oxide, and dibromochloropropane (DBCP)—are regulated in part because of their effects on reproductive capacity. The report reviews evidence for workplace-induced reproductive impairment, the existing regulatory structure, and options for compensation for workers who have been or may be reproductively harmed in the workplace.

Project Director: Louise Williams 226-2090

Estimated publication date: Fall 1985

Alternatives to Animal Use in Research, Testing, and Education (R)

Toxicity testing
Biomedical research
Behavioral research
Education
Animal welfare

Approximately 20 million animals are used annually for both toxicity testing and biomedical and behavioral research. In a large percentage of cases, these animals are killed during the course of, or following the completion of, the experimental protocol. Toxicity testing and biomedical and behavioral research are two very distinct disciplines, and animal use and its possible alternatives must be examined in light of their differences.

This assessment will examine the current patterns of acquisition and use of animals in the distinctly different disciplines of toxicity testing and biomedical and behavioral research. In addition, the feasibility and cost of developing technologies that could potentially substitute for animals in either of these areas will be evaluated. OTA will also analyze regulatory testing requirements in both the United States and selected foreign countries to determine whether they can be made more uniform in their acceptance of nonanimal test results.

Finally, this study will briefly summarize the ethical issues concerning animal use in order to help understand the reasons for the current controversy.

Project Director: Gary Ellis 226-2099

Estimated publication date: Fall 1985

Food & Renewable Resources (226-2266)

Innovative Biological Technologies for Lesser Developed Countries (WP)

Agricultural research
Agricultural innovations

This workshop proceeding reviews innovative biological technologies that the Agency for International Development could use to help lesser developed countries enhance the productivity of their soils, reduce their need for costly chemical fertilizers, and increase food supplies.

Key Contact: Walter Parham 226-2264

Published: September 1981; Reprinted, July 1985

Africa Tomorrow: Issues in Technology, Agriculture, and U.S. Foreign Aid (TM)

Agriculture
Africa
Food supply
Technology transfer

The United States has a stake in the agricultural development of sub-Saharan Africa. Alleviating hunger and malnutrition, expanding stable markets for U.S. products, and maintaining the availability of critical and strategic materials provide humanitarian, economic, and political reasons for a continuing American interest in Africa. Most African countries are predominantly agricultural and their well-being and future development are tied closely to that sector. Therefore, agricultural assistance probably will continue to be a major area of U.S. involvement.

This technical memorandum outlines major issues constraining the development and transfer of sustainable technologies for low-resource food producers. The findings reflect broad consensus on which potential congressional action can be based.

Project Director: Phyllis Windle 226-2265

Published: December 1984

Low-Resource Agriculture in Developing Countries (R)

Agriculture
Food production
Technology transfer

Most people in developing countries are subsistence farmers who cannot obtain or afford the expensive fertilizers and pesticides upon which high-yield (Green Revolution) technologies are based. Thus, as populations grow and fuel prices rise, low-resource agricultural technologies are receiving increased attention from donors and researchers. For example, international donors such as the Peace Corps and the World Bank are giving high priority to research and development projects that enhance rather than replace low-resource, traditional farming methods. This is particularly true for programs in Africa where subsistence farmers hold the key to increasing food production and where the continuing need for massive food aid demonstrates the failure of many past agricultural, development assistance and resource protection policies.

By examining low-resource agriculture worldwide, this assessment will help Congress evaluate programs and formulate policies related to both U.S. agriculture and foreign policy. In order to do this, OTA will: 1) determine which of these technologies can increase African food production in socioeconomically and environmentally sustainable ways:

2) identify the U.S. role in technology development and transfer; 3) assess actual and potential benefits to the U.S. from participation in international agricultural research on low-resource methods; and 4) evaluate certain aspects of the Sahel Development Program as a case study in U.S. public and private assistance to Africa.

Project Director: Phyllis Windle 226-2265

Estimated publication date: Summer 1987

Integrated Renewable Resource Management for U.S. Insular Areas (R)

Agriculture
Food production
Renewable resources

U.S. insular areas in the Caribbean (Puerto Rico and the U.S. Virgin Islands) and the Pacific (Guam, American Samoa, Commonwealth of the Northern Marianas, and the Trust Territory of the Pacific Islands) have experienced considerable historical land resource degradation. Freshwater supplies may be highly variable and tropical soils and waters can be relatively infertile, requiring special management considerations. Today the U.S. territories rely heavily on food imports, and many local food production technologies and incentives have been lost.

The small size and limited resources of these insular areas require that land planning consider the capability of sites to sustain agriculture and aquaculture; the probable impacts of development on other resources; and alternatives to traditional management schemes that may be more appropriate to the economies and ecologies of these areas. Technologies designed for temperate, continental agriculture and aquaculture—frequently dependent on relatively low-cost energy supplies, large capital outlays, and well-developed markets—typically are not suitable for tropical insular areas.

In order to assess technologies for insular renewable resource management and development, OTA will: 1) review data on freshwater demands, supplies and uses and assess water supply enhancement and conservation technologies; 2) assess agricultural technologies given the availability and quality of water and land supplies; 3) assess aquaculture technologies alone and in combination with agricultural technologies; and 4) assess maricultural technologies for their suitability in the insular settings; 5) identify integrated land capability analysis technologies appropriate to island resource development; and 6) assess certain opportunities in case studies that include implementation plans.

Project Director: Alison Hess 226-2223

Estimated publication date: Summer 1986

Technologies to Benefit Agriculture and Wildlife (WP)

Wildlife
Agricultural research
Natural resources

This workshop proceeding presents a broad range of papers on specific technologies that could benefit both agricultural production and wildlife habitat requirements on private lands. It also describes some constraints and opportunities to integrate agriculture and wildlife concerns and discusses policy opportunities to improve agriculture and wildlife integration.

The objectives and goals of agricultural policy and wildlife conservation policy need not be mutually exclusive. Opportunities exist for U.S. agriculture to apply new or emerging technologies that could maintain or even increase production of crops, livestock, and timber while sustaining wildlife. More, however, could be done to promote the application of such resource-sustaining technologies.

Project Director: Susan Shen 226-2256

Published: May 1985

Technology, Public Policy, and the Changing Structure of American Agriculture (R)

Agricultural policies
Farms
Agricultural innovations

During the past three decades, technological change and innovation in biological systems, labor-saving mechanization, transportation, and agricultural chemicals have played an important role in increasing agricultural productivity. They have also contributed to changing the very nature of agriculture. Today, farm operators account for only 3 percent of the U.S. population. Twenty percent of all farms now produce 80 percent of the food and fiber in the United States. Increased capital and kinds of skill are needed to sustain farms. Such changes have important implications for society.

Technology is only partly responsible for these changes. Public policy has also played a role. However, little is known about how policies in conjunction with technology adoption have affected structural change.

This assessment will focus on future and emerging technologies in the animal, plant, chemical, mechanization, and information areas and their implications for agriculture. It will assess the possibility of developing technologies for different kinds of agricultural structures. The assessment will explore links between policy and structure so policymakers can have a clearer understanding of the factors that influence the evolution of the agricultural sector.

Project Director: Mike Phillips 226-2189

Estimated publication date: Fall 1985. Interim publication: "Special Report for the 1985 Farm Bill" (SR), published March 1985.

A Special Report for the 1985 Farm Bill (SR)

Commodity
Research and extension
Farm credit
Agricultural policies

This is part of OTA's ongoing assessment of *Technology, Public Policy and the Changing Structure of American Agriculture*. It was prepared to provide assessment findings which were relevant to the 1985 Farm Bill discussions. The report focuses on three main policy areas: 1) commodity; 2) credit; and 3) research and extension. It also summarizes background information on emerging technologies and trends in structural change.

Project Director: Mike Phillips 226-2189

Published: March 1985

Technologies to Maintain Biological Diversity (R)

Agricultural development
Natural resources
Genetic engineering

Maintaining biological diversity of plants and animals is necessary to sustain and improve agriculture, to keep open future options for medical discoveries, and to maintain the raw material for industrial innovation and genetic engineering. Agricultural development needs wild plants as a source of new genes to increase yields, to improve disease resistance, and to increase the ability of crops to withstand extreme environmental stresses. Wild plants are used by the pharmaceutical industry as sources of valuable compounds that, once discovered in nature, sometimes can be synthesized in the laboratory. Animal physiology affords many clues to the origins and nature of human ailments. For example, the cotton-topped marmoset, a species of monkey susceptible to lymphatic cancer, is helping to produce a potent anticancer vaccine. Genetic engineering, an emerging technology with great potentials for agriculture, depends on biological diversity for the raw material to engineer. Thus loss of diversity could reduce the potential opportunities that this technology offers. But while the importance of diverse biological resources is receiving increasing attention, diversity appears to be declining and valuable reservoirs of germplasm seem to be disappearing.

In order to identify opportunities to maintain biological diversity, OTA will: 1) assess the status of biological diversity and its rates of change in various regions; 2) assess the economic, social, ecological, and political implications of a decline in biological diversity; 3) assess technologies (both in situ and ex situ) to maintain plant and animal biological diversity; 4) assess the role of institutions and U.S.-funded agencies (e.g., United Nations and World Bank) in developing and transferring beneficial technologies for maintaining biological diversity; and 5) identify policy options that will facilitate the development and use of such technologies to maintain biological diversity.

Project Director: Susan Shen 226-2256

Estimated publication date: Winter 1986-87

An Assessment of the U.S. Food and Agricultural Research System (R)

Agricultural research
Agriculture

The U.S. food and agricultural enterprise has been extremely successful, in part because of sustained public support of agricultural research and demonstration. As we face a future of increased demands on our agricultural resources, it is essential to ensure that the research system function as effectively as possible. This assessment: 1) evaluates the funding, benefits, and burdens of food and agricultural research; 2) determines the basis, scientific or otherwise, for the classification of research from a management prospective; 3) identifies the roles of Federal, State, and private institutions in developing technologies for solutions to international, national, regional, and State or local problems; 4) examines the management, structure, and policies of the U.S. Department of Agriculture in the conduct of food and agricultural research; 5) evaluates methods by which the expertise and interests of Federal,

State, and private research organizations can be brought to bear cooperatively in identifying priority research areas; and 6) provides public policy options for Congress that will maximize our research potential.

Project Director: Mike Phillips 226-2189

Published: December 1981. Summary available

Environmental Contaminants in Food (R)

Food contamination
Chemicals in foods

The environmental contamination of food is a nationwide problem. This assessment examines the adequacy of Federal and State efforts to deal with the environmental contamination of food. The study evaluates the effectiveness of: 1) Federal and State monitoring systems in detecting contamination episodes before they reach crisis proportions, and 2) Federal efforts to regulate contaminations.

Key Contact: Walter Parham 226-2264

Published: December 1979. Summary available

Health Program (226-2070)

Preventing Illness and Injury in the Workplace (R)

Occupational health and safety
Government regulation

One hundred million Americans work. Each year there are some 2.3 million disabling injuries and 13,200 accidental deaths in the workplace, and perhaps 100,000 people die from job-related diseases. Efforts to reduce this toll involve employers, labor organizations, nonprofit institutions, insurance companies, and Government agencies. To a major extent these efforts are directed at developing and applying control technologies--engineering controls, worker education programs, and personal protection devices.

New industrial plant construction and modernization of existing plants are expected to result from interest in increased productivity and reduced energy consumption. Such construction may offer opportunities for installing new technologies to reduce workplace health and safety hazards.

This assessment develops information about research and development, diffusion, application, and evaluation of workplace control technologies. Engineering controls, worker education programs, personal devices, and interrelationships between them are described and their role in worker protection evaluated.

One product of the assessment is a series of options that address: improving data about workplace accidents and illnesses; aiding development of appropriate technologies, their diffusion, application, and evaluation; and making control technologies available to small firms at a price they can afford.

Project Director: Mike Gough 226-2070

Published: April 1985. Summary available.

Abstracts of Case Studies in Health Technology Case Study Series

This booklet contains a description of the OTA "Health Technology Case Study Series" and abstracts of each of the case studies published.

Series Coordinator: Ginny Cwalina 226-2070.

Published: October 1984.

Federal Policies and the Medical Devices Industry (R)

Medical instruments and apparatus
Biomedical materials
Medicare/Medicaid
Regulation

During the past two decades, technologies such as automated blood chemistry analyzers, ultrasound imaging, and cardiac pacemakers have become common elements of medical diagnosis and therapy. The growth of the industry that manufactures such technologies has paralleled the growth of expenditures for medical care. The industry's sales totaled an estimated $13 billion in 1981, more than three times the 1972 level and 11 times the amount in 1958.

Congress is continually called on to develop policies that will affect the medical devices industry, but in the past has lacked adequately analyzed information to deal with the subject. Federal policies related to the research, marketing, location, and financing (medical insurance) of medical technologies, as well as to the taxation, patenting, and foreign trade of all technologies, affect the development, manufacture, and sale of medical devices.

This assessment presents basic information about the medical devices industry and analyzes the implications of alternative Federal policies. It develops information about the nature of firms that manufacture medical technologies, conducts case studies of selected medical devices, and examines present and proposed Federal policies that influence the medical devices industry and affect the cost and effectiveness of medical devices.

Project Director: Jane Sisk 226-2070

Published: October 1984. Summary available.

Nuclear Magnetic Resonance (NMR) Imaging Technology: A Clinical, Industrial, and Policy Analysis (CS)

Magnetic resonance
Medical imaging
Medical devices
Health care industry
Health insurance

This case study provides a "snapshot view" of the scientific and clinical status of nuclear magnetic resonance (NMR) imaging—an exciting new diagnostic imaging modality that has captured the interest of the medical and scientific communities and the general public. The study also provides an overview and analysis of the impact of various Federal and non-Federal policies and practices in the development and diffusion of NMR imagers as of August 1984. The policies examined include the Food and Drug Administration's premarket approval process; Health Care Financing Administration, Blue Cross/Blue Shield, and commercial insurance company reimbursement decisions; State certificate-of-need policies, and Federal financial support for research and development.

Project Director: Jane Sisk 226-2070

Published: September 1984

The Boston Elbow (CS)

Prosthetics
Physically handicapped
Medical devices
Disability benefits
Rehabilitation

The Boston Elbow is an artificial arm, battery-powered and myoelectrically controlled (i.e., controlled by signals from an amputee's stump muscles). This prosthetic device reproduces elbow flexion and extension. This device is only one of several compensatory options for people who have lost an arm. Nonprosthetic measures as well as competing prostheses are available to most amputees.

Distribution of the Boston Elbow and other compensatory options is at least in part a function of public policy, especially the design and implementation of disability benefits programs. For policy purposes, people (excluding children) with disabilities seem to fall into three groups—veterans, workers, and citizens—each with eligibility criteria set by law.

This case study shows how the Boston Elbow fares differently in different programs intended for these groups.

Project Director: Jane Sisk 226-2070

Published: November 1984

The Market for Wheelchairs: Innovations and Federal Policy (CS)

Wheelchairs
Physically handicapped
Medical devices
Health care industry
Rehabilitation

The characteristics, prices, and durability of wheelchairs are critical both to the quality of life of their users and to the costs incurred by the users, insurers, and government agencies. This case study focuses on how Federal policies affect innovations in wheelchair characteristics. The case study presents two examples of innovations in wheelchair design, the Power Rolls IV made by Invacare Corporation and a curb-climbing wheelchair available in parts of Europe, but not the United States. It examines the wheelchair market and notes that 1 American in 200 (approximately 1.2 million total in 1977) is a wheelchair user.

The case study also discusses Federal policies relating to wheelchairs. Although Federal research and development efforts on wheelchairs appear modest in relation to the number of users, the Federal Government is a major purchaser of wheelchairs through the Veterans Administration, Medicaid, and Medicare. The Food and Drug Administration classifies and regulates the marketing of wheelchairs under its authority to regulate medical devices. Finally, the study discusses public policy issues related to the wheelchair industry.

Project Director: Jane Sisk 226-2070

Published: November 1984

The Contact Lens Industry: Structure, Competition, and Public Policy (CS)

Contact lenses
Health care industry
Medical devices

This case study analyzes the contact lens industry in the United States. The study analyzes the relationship between industry structure and behavior, or the influence that the number, size, market power, and policies of the makers of contact lenses have on their incentives and behavior regarding competition in product development and price. It also analyzes the role played by public policy in influencing this competition, either directly or indirectly. The more important elements of public policy affect: 1) mergers, 2) market entry, 3) competition in the professional prescribing and fitting of contact lenses, and 4) the payment mechanism in the purchasing process.

Project Director: Jane Sisk 226-2070

Published: December 1984

The Hemodialysis Equipment and Disposables Industry (CS)

Hemodialysis equipment
Disposables
Medical devices
Health care industry

In the course of treatment for end-stage renal disease (ESRD), which afflicts approximately 96,000 people in the United States, most patients and their providers use an array of products produced by the hemodialysis equipment and supplies industry. This case study offers an economic analysis of this relatively new U.S. industry. The industry's existence is a consequence of modern medical advances that have made hemodialysis a viable treatment of ESRD. Moreover, it would be difficult to think of another industry that has been so clearly and directly shaped by Federal policy.

Project Director: Jane Sisk 226-2070

Published: December 1984

Technologies for Managing Urinary Incontinence (CS)

Urinary
Urinary incontinence
Medical devices
Aged
Disability
Handicap

Urinary incontinence represents a medical problem that is prevalent among the elderly and has enormous consequences for medical care costs. It is also an area in which medical devices with widely varied characteristics are used to manage or cure the underlying conditions. These devices complement other approaches to the management of urinary incontinence, and an analysis of the respective roles of alternative strategies is useful. Although the case study emphasizes mechanical devices over more conventional and widely used treatments for incontinence, such as drugs, surgery, and bladder-training procedures, these other treatments are also discussed. Evidence on the effectiveness and costs of alternative treatments is presented, and implications for public policy are discussed.

Project Director: Jane Sisk 226-2070

Published: July 1985

Medical Devices and the Veterans Administration (TM)

Veterans
Medical instruments and apparatus

This technical memorandum emphasizes internal Veterans Administration (VA) policies and procedures related to medical devices. It provides information from three different prospectives: that of the veteran as a consumer, that of the device industry as a supplier, and that of the VA itself. Topics addressed, for example, include the VA's effect on private research and development and decisionmaking more generally.

Study Director: Cindy King 226-2070

Published: February 1985

Policy Implications of the Computed Tomography (CT) Scanner (R)

Medical instruments and apparatus
Computers

This assessment examines the usefulness and costs of CT scanning, the effect of CT scanners on medical care delivery patterns, and ways to improve planning affecting such devices. It also examines emerging

and existing policies concerning the development, evaluation, diffusion, use and financing of the CT scanner.

Key Contact: Jane Sisk 226-2070

Published: August 1978

Assessing the Efficacy and Safety of Medical Technologies (R)

This assessment examines current Federal policies and current medical practices to determine whether a reasonable amount of justification be provided before costly new medical technologies and procedures are put into general use. It also examines the importance and the current status of information on efficacy and safety as well as techniques and programs for generating that information.

Medical instruments and apparatus
Safety measures
Medical innovations

Project Director: Clyde Behney 226-2070

Published: September 1978

The Impact of Randomized Clinical Trials (RCTs) on Health Policy and Medical Practice (BP)

Rational decisions at all levels in health care—from Federal Government policymaking to the treatment of a single patient by a physician—require sound information. Randomized clinical trials (RCTs), a family of experimental designs, provide the highest quality of evidence for the efficacy and safety of medical technologies. RCTs fill an obvious need for information, yet their impact in health policy and medical care remains largely undocumented. This background paper brings together the literature and current views about the actual and potential role of RCTs in decisionmaking about medical technology.

Clinical trials
Medical technology assessment
Clinical decisionmaking

In addition to descriptive historical and background information about RCTs, the chapters focus on the following topics:

- funding of RCTs and some nonrandomized clinical trials;
- current and possible future users of RCTs in health policymaking;
- criticisms of and alternatives to RCTs;
- characteristics of RCTs that appear to influence their impact;
- the published literature specifically about the impacts of RCTs on medical practice; and
- suggestions for strengthening the impact of RCTs.

Project Director: Hellen Gelband 226-2070

Published: August 1983

Strategies for Medical Technology Assessment (R)

This report considers the flow of information that is central to an effective system of medical technology assessment. OTA found that the current system for evaluating emerging, new, and existing medical technologies is inadequate in a number of respects. One of the biggest problems is that the activities of the multiple public and private sector par-

Medical technology assessment
Clinical trials
Safety and efficacy
Cost-effectiveness

ticipants in the system are not well coordinated. Furthermore, some classes of medical technologies are not adequately evaluated for safety, efficacy, cost-effectiveness, or social and ethical implications prior to their adoption by the health care system.

OTA concludes that a more integrated system for assessing medical technologies, possibly with stronger links between Federal agencies and private sector organizations such as medical specialty societies, might be more effective. The report discusses methods and data that can be used to measure a medical technology's outcomes as well as the methods and mechanisms that can be used to synthesize the various types of information.

Key Contact: Kerry Kemp 226-2070

Published: September 1982

Blood Policy and Technology (R)

Blood diseases
Blood banks

Over the past decade, there have been major changes in the technologies for dealing with blood collection and distribution and for monitoring the quality of blood products. Research on blood and its components promises to lead to further changes. The supply system, however, remains dependent on human sources, and voluntary donations, rather than paying for blood, have been encouraged. Today, less than 5 percent of all whole blood collected in the United States is bought. However, use of blood components instead of whole blood has increased significantly. Commercial plasma collection centers account for about 70 percent of U.S. plasma production, and the United States is a major exporter of plasma and its components.

A new disease, acquired immunodeficiency syndrome (AIDS), has recently been linked to blood products. It may have significant impacts on the blood donor system: 1) What technologies are available to screen donors without discouraging donations? and 2) What technologies can be used to protect those receiving blood from the disease?

This report assesses technologies affecting the availability, uses, and risks of blood. It examines promising new technologies for: 1) blood collection, processing, storage, and distribution; 2) identification, isolation, production, and use of blood components; 3) blood substitutes; and 4) identification and prevention of blood-transmitted diseases and other risks.

Project Director: Larry Miike 226-2070

Published: January 1985. Summary available.

Review of the Public Health Service's Response to AIDS (TM)

AIDS
Public health
Blood diseases

This study reviews the recent and proposed activities of the Public Health Service (PHS) in response to acquired immunodeficiency syndrome (AIDS), and evaluates the planning, resources and staffing of PHS's efforts to control AIDS. In particular, the memorandum exam-

ines: 1) the adequacy of PHS's confirmation of the causal relationship between the newly discovered retrovirus HTLV-III and AIDS and the adequacy of research to identify other possible agents involved; 2) the adequacy and timeliness of PHS's redirection of general AIDS research toward HTLV-III work, including research on blood, on treatment protocols, on animal models, and on epidemiological work; 3) the adequacy and scope of efforts to develop vaccines against the disease; 4) the adequacy and timeliness of the distribution of new knowledge and information among researchers and regulators; and 5) the adequacy of PHS resources to support needed activities that would yield the best chances for immediate results in the prevention and treatment of AIDS.

Project Director: Larry Miike 226-2070

Published: February 1985

Monitoring of AIDS-Related Activities

AIDS
Public health
Blood testing

This is a continuation of the OTA technical memorandum *Review of the Public Health Service's Reponse to AIDS*. The study will continue to monitor the coordination and allocation of Federal resources on AIDS research, as well as research in such areas as the transmissibility and natural history of the disease, the development of new treatments, and the progress on vaccine efforts. The study will also focus on the use of the blood test for detecting exposure to the HTLV-III virus, the Public Health Service efforts on AIDS education and preventive practices, and the Department of Health and Human Service's role in the delivery and financing of clinical care to AIDS patients.

Project Director: Larry Miike 226-2070

Estimated publication date: Ongoing

Technologies for Determining Mutation Frequencies in Human Beings (R)

Genetic research
Blood testing
Human mutations

Mutations are permanent changes in the genetic information contained in chromosomes and DNA of cells. When they occur in germ cells—egg or sperm cells—they are passed on to succeeding generations. Always a concern in public health, mutations are becoming a policy issue because of claims that they have been caused by exposures to radiation and chemicals. Little is known about the frequency of human mutations, and evidence is insufficient to decide whether or not external factors contribute in any significant way to the frequency despite the reasonable contention that they probably do.

Technologic breakthroughs may make it possible to determine mutation rates directly. The new methods require drawing blood and analyzing proteins or DNA or a particular gene for genetic changes.

This assessment will: 1) detail the status and limits of knowledge about human mutation and mutation frequencies, 2) review the current methods used to study human mutations, 3) describe methods now under development and being considered, 4) estimate when each of the new methods might be available for studying human populations and the

size of the experiments that would be necessary to produce useful results, and 5) develop policy options to spur the research and application of appropriate methods.

Project Director: Mike Gough 226-2070

Estimated publication date: Winter 1986

Medical Technology and Costs of the Medicare Program (R)

Medicare/Medicaid
Medical instruments and apparatus
Health insurance

The report covers a broad range of mechanisms to limit Medicare costs related to medical technology. The first part of the report presents information on the interactions between medical technology and Medicare. It analyzes specific Medicare policies—eligibility, benefits, payment, and beneficiary cost-sharing policies—that have been important to the adoption and use of medical technology. In addition, it reviews evidence on the contributions of medical technology to increases in general health care costs and in Medicare costs.

The second part of the report provides information on policies that have been and could be used to influence medical technology adoption and use and restrain the increase in Medicare program costs. It covers four general areas: coverage of specific technologies, payment to hospitals, payment to physicians, and approaches to changing incentives, for the adoption and use of technologies, that do not directly involve Medicare payment. Finally, it presents options for Congressional consideration.

Project Director: Anne Burns 226-2070

Published: July 1984. Summary available.

The Effectiveness and Costs of Alcoholism Treatment (CS)

Alcoholism
Aversion therapy
Detoxification
Inpatient treatment
Health insurance

Alcoholism constitutes a vast syndrome of medical, economic, psychological, and social problems. From 10 million to 15 million Americans are either alcoholic or have serious problems directly related to the abuse of alcohol. The economic cost of alcoholism and alcohol abuse, a major portion of which is lost work productivity, may be as high as $120 billion annually.

For the small proportion of alcoholics or alcohol abusers actually receiving treatment, the aggregate costs of treatment have risen substantially. In 1982, Medicare alone spent an estimated $150 million for the treatment of alcoholism. Modalities of treatment for alcoholism include the use of drugs, psychologically based treatments, and treatments based on group and community efforts.

The available research evidence, reviewed in this study, seems to indicate that any treatment of alcoholism is better than no treatment. Medicare and Medicaid have encouraged the use of inpatient, medically based treatment for alcoholism. The available evidence seems to indicate that medically based inpatient rehabilitation services are far more expensive, but not necessarily more effective, than primarily nonmedical inpatient or outpatient treatment. Further research is needed both

to specify how to match patients to treatment and setting and to test competing claims of effectiveness.

Key Contact: Anne Burns 226-2070.

Published: March 1983.

Diagnosis-Related Groups (DRGs) and the Medicare Program: Implications for Medical Technology (TM)

Prepared in conjunction with the OTA's assessment *Medical Technology and Costs of the Medicare Program*, this technical memorandum examines diagnosis-related groups (DRGs) and their implications for use in Medicare's prospective payment system. The study reviews the development of DRGs and compares them to alternative case-mix measures. It also includes an analysis of the implications for medical technology use and adoption of using DRGs as an integral part of a per-case hospital payment system. A principal finding of the study is that while DRGs are ready for use in a per-case payment system, their implementation needs to be closely monitored. In the long run, the study concludes, the success of DRG payment will rest heavily on its flexibility and adaptability to technological change.

Diagnosis-related groups
Medicare
Prospective payment
Hospitals

Project Director: Anne Burns 226-2070.

Published: July 1983.

Intensive Care Units: Costs, Outcome, and Decisionmaking (CS)

This case study provides an overview of the development of intensive care units (ICUs) and their rapid diffusion into medical practice, and presents information on their utilization costs and reimbursement. It also describes various measures of outcomes of intensive care and reviews the outcome literature. Finally, it discusses the intricacies of decisionmaking in the ICU and policy implications of ICUs.

Intensive care
Biomedical ethics
Health insurance
Clinical outcomes
Health care costs

Project Director: Anne Burns 226-2070.

Published: October 1984.

The Cost Effectiveness of Digital Subtraction Angiography in the Diagnosis of Cerebrovascular Disease (CS)

Digital subtraction angiography (DSA) is a new, and rapidly developing, technology in the field of diagnostic radiology. DSA is one of several computer-assisted radiologic tools for diagnosing conditions associated with the internal structure of blood vessels.

This case study selects a single category of clinical problems where DSA is in use on a broad scale—cerebrovascular disease—as the context within which the cost-effectiveness of DSA is explored.

Cerebrovascular disease
Imaging systems in medicine
Digital subtraction fluoroscopy
Medical devices

Project Director: Anne Burns 226-2070.

Published: May 1985.

The Effectiveness and Costs of Continuous Ambulatory Peritoneal Dialysis (CS)

Hemodialysis
Medicare/Medicaid
Health care
Medical devices

The advent of continuous ambulatory peritoneal dialysis (CAPD) in the late 1970s has dramatically changed treatment options available to the patient with end-stage renal disease (ESRD). Since it was approved for reimbursement by Medicare in 1979, the use of CAPD has increased rapidly, and, by 1983, an estimated 8,000 patients, two-thirds of patients on home dialysis, or 12 percent of the entire chronic dialysis population were being treated by this modality. Diffusion has resulted from a combination of strong professional endorsement, patient acceptance, and vigorous marketing efforts by industrial producers of CAPD supplies and equipment. Some projections suggest that up to 40 percent of the ESRD population may be suitable candidates for CAPD.

This study: 1) compares the medical effectiveness of hemodialysis (HD) performed in dialysis centers and hospitals with CAPD or HD performed at home; 2) evaluates the costs of treatment by each of these modalities; and 3) identifies critical issues that require further evaluation.

Project Director: Anne Burns 226-2070

Published: September 1985

OTA's First Report on the Prospective Payment Assessment Commission (ProPAC) (SR)

Health insurance
Medicare
Prospective payment
Medical technology assessment
Diagnosis related groups

The Prospective Payment Assessment Commission (ProPAC) is an independent commission established by Congress to make recommendations to the Secretary of Health and Human Service and Congress about changes in Medicare's prospective payment system established under the Social Security Amendments of 1983. OTA is responsible for oversight of the Commission.

This special report contains information on the appointments and staffing of ProPAC, the organization of the Commission, the status of various administrative and operating activities, and the substantive areas of concentration. It discusses the Commission's progress in key areas of operation and contains questions that the Congress, and therefore OTA, may wish to analyze in the coming year. The key finding is that ProPAC's overall performance in its first year of operation has been of a high order, and in some respects exceptionally high.

Project Director: Anne Burns 226-2070

Published: March 1985

Medicare's Prospective Payment System: Strategies for Evaluating Cost, Quality, and Medical Technology (R)

Medical economics
Medical innovations
Medicare

In order to control the rapidly rising costs of the Medicare program, the Social Security Amendments of 1983 mandated a new Medicare hospital payment system: prospective payment based on diagnosis-

related groups (DRGs). The new system is radically different from previous ones. Plans must be made for a comprehensive evaluation of its effects, and assumptions about its implications must be explicitly tested. One of the key areas of impact will be on the development and use of medical technology. The OTA study will not be the evaluation itself; rather, it is to be a complete layout of the critical, medical technology-related issues that need addressing. It will:

Prospective payment
Diagnosis-related groups
Health insurance

- identify the range of possible effects related to medical technology and its use;
- identify evaluation measures;
- identify ongoing or planned monitoring and evaluation activities;
- identify shortcomings and gaps in these activities; and
- develop an overall design for evaluation, including timing, methodology, priorities, and the role of current or planned efforts.

Project Director: Judith Wagner 226-2070

Estimated publication date: Fall 1985

Physicians and Medical Technology: Use, Cost, and Payment Methods (R)

Physicians directly or indirectly account for an estimated 80 percent of expenditures on medical technologies. Efforts to control the use and cost of medical technology have concentrated on hospitals, as evidenced by the current approach under Medicare to pay hospitals according to diagnosis-related groups (DRGs). But attention is increasingly turning to physicians, because as gatekeepers, they control much of technology use and because technologies may move out of locations where payment is constrained and into physicians' offices and other ambulatory sites. In addition, Medicare expenditures on physician services have been growing more rapidly than those for hospital care.

Physicians
Medicare/Medicaid
Health care expenditures
Prospective payment

In accordance with a provision in the Deficit Reduction Act of 1984 (Public Law 98-369), OTA is examining alternative methods of paying physicians under the Medicare program, with particular attention to the use and cost of medical technology.

This study will examine current patterns of physician expenditures and use, identify areas of inefficient or inequitable technology use for Medicare beneficiaries, and develop options for physician payment under Medicare to address the problems identified.

Project Director: Jane Sisk 226-2070

Estimated publication date: Spring 1986

Nurse Practitioners: Cost and Payment Status (BP)

This background paper will examine the costs, effectiveness, and payment status of nurse practitioners, certified nurse-midwives, nurse clinicians, physician assistants, and Medex in the United States. It will update and expand a 1981 OTA case study, *The Costs and Effectiveness of Nurse Practitioners*.

Nurses and nursing
Physicians
Cost-effectiveness
Quality of care
Access to care

It will cover the following areas: 1) the emergence of the professions of nurse practitioner, certified nurse-midwife, and physician assistant including Medex; 2) the effects of these professions on access to care; 3) the quality of care offered by these professions; 4) the costs associated with these professions; 5) practice location and employment data for these professions; and 6) the extent to which public programs and private health insurance pay for these professions.

The background paper will examine the potential effects of current major changes in the health sector on the future status of new health professionals. It will contain conclusions based on the findings concerning costs and effectiveness, quality of care and access, and policy implications for federally funded training programs and reimbursement policies concerning these professions.

Project Director: Gloria Ruby 226-2070

Estimated publication date: Fall 1985

The Implications of Cost-Effectiveness Analysis of Medical Technology (R)

Medical economics
Medical research
Cost-effectiveness

This assessment analyzes the feasibility, implications, and usefulness of cost-effectiveness and cost-benefit analysis in health care decisionmaking. The prime focus of the assessment is one of the application of CEA/CBA to medical technology, i.e., the drugs, devices, medical and surgical procedures used in medical care, and the organizational and support systems within which such care is provided.

It examines three major issues: 1) the general value of CEA/CBA in decisionmaking about the use of mecial technology; 2) the methodological strengths and shortcomings of the technique; and 3) the potential for initiating or expanding the use of CEA/CBA in six health care programs—reimbursement coverage, the professional standards review organizations (PSROs), health planning, market approval for drugs and medical devices, R&D activities, and health maintenance organization (HMOs)—and, most importantly, the implications of any expanded use.

Project Director: Clyde Behney 226-2070

Published: August 1980. Summary available

The Efficacy and Cost Effectiveness of Psychotherapy (CS)

Psychotherapy
Mental health
Health insurance
Cost-effectiveness
Medical technology assessment
Clinical outcomes

This case study summarizes the existing literature on the effects of mental health treatments and describes a variety of methodological and substantive problems that arise in assessing these effects. The case study addresses four issues—definition, assessability, efficacy, and cost-effectiveness—that are centrally related to the evaluation of psychotherapy.

Part of the confusion about psychotherapy's effectiveness has to do with reviewer's use of different definitions. The case study itself uses a broad definition that includes treatments based on Freudian ideas about psychodynamics, as well as newer therapies based on theories of learning and cognition. It describes and analyzes the variety of methods that

have been used to assess psychotherapy. It also considers what types of information can be obtained by application of these techniques.

The focus of the case study's efficacy analysis is a discussion of six important earlier reviews of the psychotherapy literature. The case study also reviews many of the evaluative studies themselves. They all seem to support the finding that (under specified conditions) there is evidence as to psychotherapy's effectiveness. The case study concludes there is a great need for well-conducted research that evaluates psychotherapy for specific disorders under specified treatment conditions.

Key Contact: Denise Dougherty 226-2070

Published: October 1980

Status of Biomedical Research and Related Technology for Tropical Diseases (R)

Tropical diseases
Biomedical research
Medical research

The human and financial effects of tropical diseases are enormous. Worldwide, hundreds of millions of people suffer from the various tropical diseases (e.g., malaria, trypanosomiasis, schistosomiasis, leprosy), with devastating implications for tropical countries' economies and standards of living. Because of the potential impact of technological advances in the area of tropical diseases and the historically modest levels of research and development funding in that area, it is important to examine whether Federal funds are being appropriated in a manner reflective of scientific opportunities and of the current burden posed by such diseases.

This assessment examines the status of biomedical and epidemiological research and related technology development in the area of tropical diseases. It analyzes data on the diseases' prevalence, on the burden posed by them, and on sources and levels (both U.S. and foreign) of research funding. The assessment defines research priorities: It examines the status of research and technology in the major disease areas, identifies areas of promise for continued or increased funding, and presents a series of options for making decisions about research funding, technology development and testing, and other policies regarding tropical diseases. In addition, the assessment develops specific information on the Gorgas Memorial Institute of Tropical Medicine and its research areas and accomplishments.

Project Director: Hellen Gelband 226-2070

Published: September 1985. Summary available.

A Review of Selected Federal Vaccine and Immunization Policies (R)

Preventive medicine
Immunizations

This assessment analyzes the problems, issues, and policy options in four areas of Federal vaccine-related policies: 1) vaccine research, development, and production; 2) vaccine safety and efficacy; 3) cost-effectiveness of vaccination and implication for reimbursement; and 4) liability and compensation of vaccine-related injuries.

Key Contact: Jane Sisk 226-2070

Published: September 1979

Assessment of Technologies for Determining Cancer Risks From the Environment (R)

Cancer
Carcinogens
Environmentally induced diseases

The report discusses the strengths and weaknesses of data sources used for determining trends in cancer occurrence and mortality, and reviews estimates of the contribution of various factors—behaviors and exposures—associated with cancer in this country. Evidence linking today's cancers with past carcinogenic influences has come mainly from epidemiology, which continues to scrutinize aspects of the American lifestyle, for possible association with cancer.

The assessment examines the use of extrapolation techniques for estimating human carcinogenic risks from test-derived data; the advantages and disadvantages of the available extrapolation models; and the ultimate use of these techniques in setting standards for controlling exposures under diverse legislation. The report also looks at the problems of decisionmaking in the face of the often great uncertainties accompanying scientific findings and the proposals for regulatory reform that have grown out of concern for these issues.

Project Director: Michael Gough 226-2070

Published: June 1981. Summary available.

Methods for Studying Environmental Health Problems in Small Populations (BP)

Environmental health
Adverse health effects in small communities
Epidemiology

In recent years, many communities around the U.S. have become concerned with what appears to be higher than expected numbers of cancer cases, babies with birth defects, and other health problems. Heightened awareness of the ubiquity of hazardous waste dumps and the occurrence of chemical contaminants in water supplies has contributed to the fear that these may be the causes of health problems. Many cases of community concern will be unfounded, but there is good reason to believe that some communities are truly affected and are suffering adverse health effects.

Traditional epidemiologic methods were not developed to study chronic health effects in relatively small groups of people. With the use of those methods, it would be difficult if not impossible adequately to investigate any but catastrophic increases in the occurrence of cancers or other relatively rare events. Most studies would fail to find an increase even if it were there, except in the case of extremely large increases, because the studies lack power when dealing with small numbers. The ways in which one measures exposures and health outcomes, as well as the limits of statistical inference, present serious challenges.

This background paper will describe the approaches that are currently available to study small community situations, address the technical problems that still exist, and assess the areas in need of development.

Project Director: Hellen Gelband 226-2070.

Estimated publication date: Fall 1985.

Evaluation of Agent Orange Protocol

Chemical exposure
Veterans
Veteran Administration

The epidemiologic study by the Veterans Administration of the long-term health effects resulting from exposure to Agent Orange was mandated in the Veterans Health Programs Extension and Improvements Act of 1979 (Public Law 96-151). The same law requires OTA to review the study design and monitor the conduct of the study. An advisory panel was assembled to carry out the review. The study design was tentatively approved in March of 1982. The Centers for Disease Control will carry out the study. OTA will continue to monitor the study and its progress.

Project Director: Mike Gough 226-2070

Estimated publication date: Ongoing

Technology and Handicapped People (R)

Physically handicapped
Technology and social problems

This assessment examines the specific factors that affect the research and development, evaluation, diffusion and marketing, delivery, use, and financing of technologies directly related to disabled people. The problems and processes of the development and use of technologies are analyzed in the context of societal allocation of resources and the setting of goals for public policy. The study concentrates on two critical matching processes: between technological needs and technological capabilities; and between allocation goals or intents and resource capabilities.

Project Director: Clyde Behney 226-2070

Published: May 1982. Summary available

Mental Health Services for Children (BP)

Mental health

The mental health needs of children are unique. Although estimates of the number of emotionally disturbed children vary, the President's Commission on Mental Health estimated that 5 to 15 percent of all children and adolescents (that is, anywhere from 3 to 9 million children) require some type of mental health service. The most recently available data suggest that fewer than 1 million children actually receive any type of mental health services. In addition, the level and type of service provided to children may sometimes be inappropriate.

This background paper will address the following areas: 1) scope of the problem, including estimates of the numbers of children (those under 18) in need of mental health services and the types of problems affecting children; 2) mental health services available to children; 3) effectiveness of the various mental health treatments and the appropriate mix of mental health services for children; 4) the roles third party coverage and the Federal and State governments play in the provision of mental health services for children; and 5) identification of areas for further research, and analysis of possible approaches to research and the provision of care.

Project Director: Denise Dougherty 226-2070

Estimated publication date: Fall 1985

Technology and Indian Health Care: Effectiveness, Access, and Efficiency (R)

Indian health care

Despite some improvement, the health status of American Indians and Alaska Natives remains substantially below that of the general U.S. population. Because of the Federal Government's special responsibilities for the delivery and financing of health care for nearly 1 million of the 1.5 million Indians in the United States, Congress continues to be concerned about the quality, appropriateness, accessibility, and financing of such care.

This project will be a comprehensive examination of health technologies and services provided to Indians and of whether those technologies and services are appropriate and adequate in view of the health problems of Indians. The assessment will: 1) analyze the quality and adequacy of data on Indian health status, including trends over time; 2) identify the types and distribution of technologies and services available through the Indian Health Service and other providers; 3) determine the desirable range and methods of delivery of health-related technologies and services, given our conclusions on health status, and compare this range to the current situation; and 4) develop policy options to improve the selection, provision, financing, and delivery of technologies and services to Indian populations.

Project Director: Larry Miike 226-2070

Estimated publication date: Spring 1986

Scientific Validity of Polygraph Testing: A Research Review and Evaluation (TM)

Lie detectors

This technical memorandum evaluates the scientific validity and reliability of the polygraph. The evaluation is based on a critical review of all relevant prior research and identifies gaps in existing research and needs for further research.

Key Contact: Denise Dougherty 226-2070

Published: November 1983

Communication & Information Technologies (226-2240)

Information Technology Research and Development: Critical Trends and Issues (R)

Computers
Telecommunications
Artificial intelligence
Technology policy

Computer and communications technologies are vital components of the domestic economy. They also form the information services network that supports and enhances productivity in every other sector of the economy. In addition, these technologies are indispensable components of our national security system.

Underlying current U.S. leadership in information technology has been a strong national research and development effort on the part of both government and industry. Traditional patterns of research and development are likely to alter significantly as a result of shifts in industry structure, international competition, and technological advances that are now taking place.

The report characterizes those shifts in R&D, projects their implications for U.S. leadership in computer and communication technology, and analyzes the potential influences of Federal policy on the directions and levels of R&D support.

Key Contact: Fred Weingarten 226-2240

Published: December 1984. Summary available

Artificial Intelligence R&D (BP)

Artificial intelligence

This paper examines the current state of R&D in artificial intelligence, defines the field in terms of the principal current fields of work, and assesses the role of Federal funding in advancing the technology.

Project Director: Rick Weingarten 226-2240

Estimated publication date: Fall 1985

Scientific Use of Supercomputers (BP)

Supercomputers

This background paper assesses progress in Federal efforts to make supercomputers available to the U.S. scientific research community. It will explore issues of impacts on technology development, facility management, software development, and networking.

Project Director: Prue Adler 226-2240

Estimated publication date: Fall 1985

Microelectronics R&D (BP)

Microelectronics

This background paper examines the current state of microelectronics technology. It will assess the impact of Federal and private R&D support on both in advancing further silicon-based device technology and in developing the potential of newer technologies such as gallium arsenide.

Project Director: Arati Prabhakar 226-2201

Estimated publication date: Fall 1985

Automation of America's Offices (R)

Computer networks
Office technologies
Information services

Increasing use of word processing systems, desktop computers, optical disks, telecommunications, and other forms of office automation is likely to significantly affect public and private sector office environments. These advanced office technologies can increase productivity. Over the long term, automated equipment and systems will be integrated within the office, through local area networks, and the transmission of information generated and/or manipulated within these networks across long distances by means of enhanced communication services.

Widespread utilization and integration of information and communication technologies are likely to change the organization of the office, the structure of office occupations (and their inherent skill levels), the location of work, and the numbers of individuals employed. This raises issues of interest to Federal policymakers concerned with U.S. economic conditions, research and development, industrial policy, telecommunications policy, employment, education and training, Federal procurement and management, and privacy and security of information. This assessment analyzes these developments and describes their implications for public policy.

Project Director: Vary Coates 226-2240

Estimated publication date: Fall 1985

Computerized Manufacturing Automation: Employment, Education, and the Workplace (R)

Automation
Manufacturing industries
Industrial robots
CAD/CAM systems

New computer and communication technologies are providing the foundation for a new wave of industrial automation, including such technologies as computer-aided design (CAD), computer-aided manufacturing (CAM), robotics, and manufacturing management systems. These technologies can be merged to form flexible manufacturing systems.

While computerized (or "programmable") automation is expected to enhance the productivity and competitiveness of industries that use it, it is also likely to have significant, broader impacts on the Nation's economy, industrial structure, and work force. Computerized automation will thus present both opportunities and problems to Federal policymakers concerned with the state of the U.S. economy, international trade, employment, and training programs. This assessment examines these developments and analyzes their implications for public policy.

Key Contact: Fred Weingarten 226-2240

Published: April 1984. Summary available. Interim publication: "Automation and the Workplace: Selected Labor, Education, and Training Issues" (TM), published March 1983.

Informational Technology and Its Impact on American Education (R)

Education technology
Microcomputers
Information services

Over the last decade, the educational system has been increasingly pressed to meet a variety of new needs on a constant or even shrinking budget. The Federal and State Governments now require that schools provide equal educational opportunities to groups traditionally

outside the mainstream, such as the handicapped. Changing needs for job skills and changing demographic conditions also present new demands for education and training beyond the ages traditionally considered as the educational years. Information technology potentially provides opportunities for education systems to improve productivity and quality of instruction, and to offer more flexibility both in content and in the time and place of offering. The study identifies relevant technology and R&D activity, and the providers and users of curricula. It assesses the likely impacts of selected alternative policies on the use of information technology and education.

Project Director: Fred Weingarten 226-2240

Published: November 1982

Computer-Based National Information Systems: Technology and Public Policy Issues (R)

Computer networks
Information policy

This report presents the results of an overview study on the use of computer technology in national information systems and the public policy issues related to that use. The purposes of the report are: 1) to provide a general introduction to computer-based national information systems; 2) to provide a framework for understanding computer and information policy issues; 3) to provide a state-of-the-art survey of computer and related technologies and industries; and 4) to provide a foundation for other related studies.

Project Director: Fred Wood 226-2240

Published: September 1981. Summary available

Intellectual Property Rights in an Age of Electronics and Information (R)

Intellectual property
Information technologies
Electronics

This assessment identifies and analyzes trends in the development of the new information technologies to determine those areas where there might be gaps in the laws and practices of intellectual property. It examines how their widespread deployment and use might alter the value of information and thus affect the future creation, production, distribution, use of, and access to information and knowledge-based products. Moreover, it identifies and evaluates policy strategies—legal, technological, economic, and social—for addressing intellectual property issues in an age of electronics. Examples of some of the issue areas included are: legal and institutional issues resulting from rapid technological change; technological issues that result from the impact of intellectual property law on technology; sociopolitical issues arising from the public/private aspects of information; economic issues arising from the enhanced value of information and information services; international issues resulting from the increased flow and value of information across national boundaries; and ethical issues arising from the conflict between public laws and private practices.

Project Director: Linda Garcia 226-2240

Estimated publication date: Winter 1985-86

Federal Government Information Technology: Congressional Oversight and Civil Liberties (R)

Computer networks
Information services
Telecommunication policy
Privacy and security
Electronic surveillance
Computer modeling and decision support

The U.S. Government is at the threshold of a major transition to the next generation of computerized information systems and other information technology. Current Government use of these technologies has generated questions about their impacts on Government.

This study will evaluate and assess the impacts and policy implications of the use of such systems in key areas of concern to Congress. It will ascertain where and how computerized systems might change the governmental process and mechanisms for congressional oversight in such areas as: information privacy; computer matching and profiling; electronic surveillance technology and civil liberties; information technology management, planning, and procurement; information security; computer crime; computer modeling; and computer-based decision support.

Project Director: Fred Wood 226-2240

Estimated publication date: Winter 1985-86. Interim publication: "Information Technology and the Social Security Administration" (BP), Winter 1985-86.

New Communication Technologies: Implications for Privacy and Security (R)

Information technology
Telecommunications

The Federal Government, the largest single user of information technology equipment, faces major changes in the nature and uses of communications technology. New generations of the products—such as local and wide area networks, software-controlled switching, digital communications integrated with computers, and satellite and fiber optic transmission—provides greater capability to managers and users for accessing, manipulating, and transmitting information. In addition, the Government, like the private sector, is rapidly expanding the number of ways it uses information technology to accomplish its business. At the same time, the industries and institutions that develop and sell these products are changing, forcing major adjustments in Government management strategy. These new capabilities and uses challenge the integrity of the Government's information system. The assessment will examine new and prospective capabilities of communications technology, assess their impact on privacy and security, and analyze how the combination of technical, administrative, and legal safeguards can cope with privacy and security implications.

Project Director: Charles Wilk 226-2240

Estimated publication date: Fall 1986

Effects of Information Technology on Financial Services Systems (R)

Information services
Financial institutions
Electronic funds transfer

The use of new telecommunications and computer technologies in the financial industry is changing both the character of the industry and its relationships to its customers. Technology allows financial institutions to alter and diversify the services offered, to distribute them more

broadly, and to link them together into national and worldwide networks. Technology also enables new kinds of firms to enter the market—firms often unconstrained by the regulatory structure under which traditional providers of financial services have operated. Future technological developments may offer additional possibilites for developing innovative financial services for both individial consumers and businesses, and could, therefore, signficantly change the structure of the finacial services industry.

This report analyzes how technological trends might affect the structure of the industry, its offerings, and its relationship to users, as well as identify the implications of the developments for public policy.

Key Contact: Rick Weingarten 226-2240

Published: September 1984. Summary available.

Oceans & Environment (226-2155)

Protecting the Nation's Groundwater From Contamination (R)

Groundwater
Water pollution control

Groundwater resources presently supply about 25 percent of all freshwater requirements in the United States, including about 50 percent of domestic drinking water needs. At the same time, the Nation is increasing its use of the subsurface for waste disposal and other nonwaste-related purposes that are threatening the quality of the groundwater resource. Groundwater contamination that can be attributed to human activity is being detected nationwide and with increasing frequency, and it can have serious and long-lasting impacts on human health, the environment, and local and regional economies.

This study provides a comprehensive technical framework to assist Congress in understanding and addressing the major groundwater contamination issues facing the Nation. Issues examined include the nature and extent of groundwater contamination problems, present efforts and capabilities to detect, correct, and prevent contamination, and Federal and State protection activities. It also addresses key Federal policy options.

Project Director: Paula Stone 226-2004

Published: October 1984 (2 volumes). Summary available

Acid Rain and Tranported Air Pollutants: Implications for Public Policy (R)

Transported air pollutants
Acid rain
Ozone

The controversy over transported air pollutants—of which acid rain is one example—revolves around suspected damage to lakes and streams, forests and soils, agricultural crops, building materials, and human health. Some individuals and groups believe that more stringent measures should be taken now by Congress to control pollutant emissions. Others, pointing to the uncertainties in our knowledge of the causes and consequences of transported air pollutants, are concerned that such action may be premature.

The assessment characterizes the potential benefits of acting now to abate long-range transported air pollution and the potential costs of action that may be premature. The study: 1) identifies the resources potentially at risk, as well as the societal concerns about the loss of these resources; and 2) identifies broad pollution control stratgies, and discusses their costs, potential effectiveness, and societal effects. It discusses a range of plausible, regionally oriented impact scenarios that describe the potential environmental and social consequences of transported pollutants, and actions that might be taken to control them. These scenarios do not attempt to "forecast" the future, but instead present a range of plausible consequences of these changes, in terms responsive to near-term congressional decisions.

Project Director: Bob Friedman 226-2131

Published: June 1984. Summary available

Managing the Nation's Commercial High-Level Radioactive Waste (R)

Solid Waste
Radioactive waste disposal
Nuclear fuel reprocessing

More than three decades into the nuclear age, this country still has no permanent disposal facilities for commercial high-level radioactive waste. This assessment focuses on technologies for storage, transportation, and disposal of commercial high-level waste (spent fuel or solidified waste from reprocessing). It also considers the major institutional factors involved in carrying out a radioactive waste management program over a period of many decades. This report describes major policy issues that were resolved by the Nuclear Waste Policy Act of 1982, and concludes that the Act provides sufficient authority for the safe storage and disposal of commercial high-level radioactive waste. It also analyzes other key issues that remain to be addressed in the radioactive waste mission plan to be prepared by the Department of Energy, or in subsequent legislation.

Project Director: Tom Cotton 226-2132

Published: March 1985. Summary available

Technologies for Disposing of Waste in the Ocean (R)

Waste disposal
Waste management

This assessment is examining the different technologies used or proposed for disposing of different types of waste in the ocean. The study will: 1) evaluate the role of the ocean on a technical basis—whether or not it can be used for disposal, what specific wastes might be disposed in the ocean, where such wastes could be disposed, and what technologies could be used; and 2) address waste types such as sewage effluent and sludge, dredged material, low- and high-level radioactive waste, and some industrial wastes.

It will then develop a broader waste management context, which includes waste disposal in a variety of environmental media, by comparing technical and nontechnical advantages and disadvantages of different waste management options. Finally, it will enumerate policy options within this broader waste management context, and analyze the implications of these policy options from an environmental, economic, international, and institutional standpoint.

Project Director: Bill Barnard 226-2054

Estimated publication date: Fall 1986

Oil and Gas Technologies for the Arctic and Deepwater (R)

Coastal areas
Offshore development
Petroleum industry
Ocean resources

Offshore oil and gas resources are expected to play a major role in future U.S. energy supplies. Most of these petroleum resources are expected to be found in Alaska and the deepwater of the continental shelf. Exploration and development in these frontier regions are extremely expensive; therefore very large discoveries are needed to be economical. Exploration in the frontier regions of the Atlantic Ocean and offshore Alaska has largely been disappointing. As a result, the expectations of finding offshore resources have been lowered.

The study explores the range of technologies required for exploration and development of offshore energy resources and assesses associated economic factors and financial risks. It also evaluates the environmental factors related to energy activities in frontier regions and considers important government regulatory and service programs.

Project Director: James Curlin 226-2077

Published: May 1985. Summary available.

Assessment of Maritime Trade and Technology (R)

Maritime transportation
International trade
Shipbuilding

World trade now totaling nearly $2 trillion—a fourfold increase in the past two decades—has become a dominant factor in the economic performance of both industrialized and developing countries. The international shipping industry exists to serve that trade. In the past two decades its capacity has grown almost 250 percent, as well as changed in character in response to new trading conditions and cargo demand. However, both trade and shipping volume reached a plateau in recent years, and the industry's concerns about meeting demands for growth have been replaced by concerns about managing overcapacity and improving efficiency. Prospects for merchant shipping and shipbuilding therefore must be evaluated in terms of these changing trade patterns.

This assessment of Maritime Trade and Technology traces prevailing conditions and dominant trends that are important to the way the Federal Government assumes its responsibility for developing and implementing policy. The report contains analyses of the world outlook of trade, shipping, and shipbuilding. It identifies the extent of U.S. participation in these enterprises. It analyzes the U.S. shipping and shipbuilding indutries and identifies certain weak and strong attributes. It discusses trends in technology as well as in the policies of the United States and of our major trading partners.

Project Director: Peter Johnson 226-2066

Published: October 1983. Summary available.

Alternative Cargo Policies (BP)

Cargo policies
Maritime industry
Ocean shipping
World trade

The United States increasingly depends upon international trade and shipping to maintain a healthy economy. As trade has grown in importance, so too has the Federal Government's role in assuring fair and equitable U.S. participation in international shipping.

This background paper identifies four issues areas that appear to be important not only to the health and vitality of the U.S. shipping industry, but also to other national interests involving world trade. These areas include: 1) U.S. cargo preference; 2) multilateral cargo sharing; 3) bilateral cargo sharing; and 4) national defense needs that affect cargo policy.

Project Director: Peter Johnson 226-2066

Published: August 1985.

R&D in the Maritime Industry (BP)

Maritime industry
Research and development
Shipbuilding

This study investigates those institutional or policy issues that broadly influence the quantity and quality of R&D in the United States. The study focuses on issues such as the effect of the tax, patent, and antitrust laws on research activities by the maritime industry. It also examines the ability of the current Federal organizational structure to provide a focus for maritime R&D and to stimulate industry participation in this program.

Project Director: Peter Johnson 226-2066

Published: May 1985

Marine Applications of Fuel Cell Technology (TM)

Marine applications
Fuel cells
Powerplants

This technical memorandum is an adjunct to OTA's overall assessment of Maritime Technology and draws upon the recently completed study, *New Electric Power Technologies: Problems and Prospects for the 1990s*. It includes a review of the state-of-the-art of fuel cells and possible future uses in main or auxillary powerplants for ships and other marine vehicles or systems.

Project Director: Peter Johnson 226-2066

Estimated publication date: Fall 1985

Technologies to Control Importation of Illegal Drugs (R)

Illegal drugs
Radar
Sensing devices

Control of illegal drugs entering the United States from foreign countries is an important part of Federal drug law enforcement efforts. The detection and seizure of drugs at U.S. borders depends on a number of advanced technologies, including radar and other sensing devices and specialized ships and aircraft. The Customs Service and the Coast Guard, the two agencies with primary responsibility for monitoring U.S. borders, are devoting an increasing share of their resources to intercepting illegal drugs.

A number of other Federal agencies—including the Drug Enforcement Administration, the Border Patrol, and Federal Aviation Administration, and the Department of Defense—assist interdiction programs. Technical and organizational improvements could increase the effectiveness of drug interdiction efforts. There are proposals to purchase additional equipment for Customs Service and Coast Guard programs; to develop and introduce new, more sophisticated technical systems; and to increase military assistance through the loan of military hardware and greater participation of armed forces personnel in drug control activities. This assessment will evaluate current and proposed technologies for drug interdiction, their cost-effectiveness, and their most appropriate use in controlling illegal drug traffic.

Project Director: Peter Johnson 226-2066

Estimated publication date: Winter 1986-87

Wetlands: Their Use and Regulation (R)

Wetlands
Land use

It is generally recognized that wetlands have many different values. Not only do they provide hydrological and ecological services, and possess aesthetic and recreational qualities, they also can provide attractive sites for development. Between the mid-1950s and mid-1970s about 550,000 acres, or about 0.5 percent, of the vegetated wetlands remaining in the lower 48 States were converted to other uses each year. Present national wetland conversion rates are estimated to be about 300,000 acres/year.

This report describes the ecological values of wetlands, trends in wetlands use, and the effect of Federal and State wetland programs on wetlands. In addition, it reviews existing scientific literature to provide background information on the ecological services provided by wetlands. Although this report deals broadly with wetlands and their use, many of its findings relate directly to the Army Corps of Engineers' 404 program, which is the major avenue for Federal involvement in regulating some activities that use wetlands. Furthermore, because agricultural drainage and clearing have been responsible for the vast majority of wetland conversions since the mid-1950s, OTA examined in some detail the policies that encourage the conversion of wetlands to agriculture uses.

Project Director: Bill Barnard 226-2054

Published: March 1984. Summary available.

Science, Transportation, & Innovation (226-2214)

U.S.-Soviet Cooperation in Space (TM)

Space activities
Space cooperation
National security
Technology transfer

U.S.-Soviet cooperation in space comprises a combination of scientific, foreign policy, and national security issues. It is influenced by a background of strained, unpredictable, and ambiguous relations between the two countries overall, and by the fact that international scientific and technological cooperation and the civilian and military uses of space have become complex and contentious issues in their own right.

In light of conflicting currents in U.S.-Soviet relations, therefore, balancing competing objectives and different perceptions of the U.S.S.R. will be a major challenge in determining the shape and magnitude of future U.S.-Soviet cooperation in space. The memorandum discusses four central issues: 1) the scientific and practical benefits that can be gained from space cooperation; 2) the potential transfer of militarily sensitive technology or know-how between the two countries; 3) the effect of space cooperation on foreign policy; and 4) perceptions about Soviet motivations and behavior and the course of U.S.-Soviet relations overall.

Project Director: Nancy Lubin 226-2009

Published: July 1985

Civilian Space Stations and the U.S. Future in Space (R)

Space stations
Space policy
Future space programs

Over the past quarter century, the United States has continued to increase its capabilities for operating in space. The President has directed NASA to develop the first elements of long-term in-orbit infrastructure over the next decade in a "space station" program. NASA expects that the initial elements it now favors would cost $8 billion. The complete array of elements is expected to cost at least $20 billion by the end of the century.

OTA examines questions such as the following: What are the leading alternatives for meeting foreseeable national needs for in-orbit infrastructure? How may the private sector be more fully involved in constructing, operating, and using the elements of this infrastructure? What are the prospects for important international collaboration in a space infrastructure program? What are the goals and objectives of the Nation's publicly funded space activities, and how would the character and cost of infrastructure relate to them?

Key Contact: Nancy Naismith 226-2214

Published: November 1984. Summary available. Interim publication:
"Salyut: Soviet Steps Toward Permanent Human Presence in Space" (TM), published December 1983.

Civilian Space Policy and Applications (R)

Space policy
Space programs

The United States faces increasing foreign competition in many areas of the exploration of space and the use of technologies developed to operate in the space environment particularly in applications with commercial promise. This report examines several means for addressing this competitive challenge. In particular, it investigates the options available for the future deployment of U.S. land remote-sensing systems, and explores the status of advanced satellite communications research within NASA. Further, the report assesses the potential for manufacturing useful products in space and for commercializing space transportation systems.

Project Director: Ray Williamson 226-2209

Published: June 1982. Summary available

Airport System Development (R)

Airports
Airline traffic
Air traffic control
Airport funding

The National Airspace System Plan issued by the Federal Aviation Administration (FAA) in January 1982 states that "airport capacity limitations at busy airports will be the constraining element in the National Airspace System." FAA anticipates that few, if any, new air carrier airports will be built in the next 20 years and that capacity expansion of existing airports will be severely limited by the availability and cost of land, concern about the environment and airport noise, and constraints on airport access. OTA assesses the technologies available to increase capacity or improve service at airports and the mechanisms by which the technology can be deployed and brought to bear on the problems of civil aviation.

Project Director: Larry Jenney 226-2177

Published: August 1984. Summary available

Technology, Innovation, and Regional Economic Development (R)

High technology industries
Economic growth

In the last 10 to 20 years, several regions of the United States have developed strong local economies based on "high-technology" industry—fast-growing firms engaged in the systematic development and commercialization of new products, processes, and services. Several Federal policies are aimed at encouraging the growth of these firms and the industries they compose. Many State and local development programs are also based in part on strategies for attracting or stimulating the formation of small high-technology companies.

The assessment investigates where high-technology firms are appearing and the factors that influence their location. It also examines the effectiveness of State and local initiatives to encourage innovation and high-technology development; and it addresses the appropriate Federal role in affecting the conditions for future growth.

Project Director: Paul B. Phelps 226-2049.

Published: Final report released July 1984. Interim publications:
"Census of State Government Initatives for High-Technology Industrial Development" (BP), published May 1983;
"Encouraging High-Technology Development" (BP), published February 1984.

Science Policy Special Projects (TM's)

Government services
Research & development

Three technical memoranda will discuss government funding of research as an investment, the regulatory environment for science, and the role of demographics and human resources for science.

Estimated publication date: Fall 1985

"Science as Investment: Basic Research and Decisionmaking" (TM). Key Contact: Nancy Naismith 226-2214

"The Regulatory Environment for Science" (TM). Key Contact: Nancy Naismith 226-2214

"The Impact of Demographics on Scientific and Engineering Personnel" (TM). Project Director: Gene Frankel 226-2173

Standardized Testing as a Measurement Tool for Federal Education Policy (TM)

Educational testing

Standardized achievement tests are used extensively in American schools, to obtain information on students, programs, schools and even States. This technical memorandum will examine standardized tests now used in grades K-12 to measure minimum competency, to evaluate and compare programs, and to select students for remediation or enrichment.

Project Director: Richard Thoreson 226-2139

Estimated publication date: Winter 1985-86

Transportation of Hazardous Materials: Technology Issues (R)

Hazardous materials
Waste transportation

The safe transportation of the 4 billion tons of hazardous commodities and radioactive and chemical wastes shipped annually is a concern at all levels of government. This assessment is directed toward these fundamental issues:

- the data and information systems for tracing commodity and waste transport and accident reporting,
- the adequacy of the containers used in hazardous materials transportation, and
- training needs for emergency response and enforcement personnel.

It will examine the roles of Federal, state, and local governments in these areas. The assessment will suggest alternatives for improved management of hazardous materials transportation, and develop a range of policy options.

Project Director: Edith Page 226-2175

Estimated publication date: Spring 1986. Interim publication:

"Transportation of Hazardous Material: State and Local Activities" (BP), Fall 1985.

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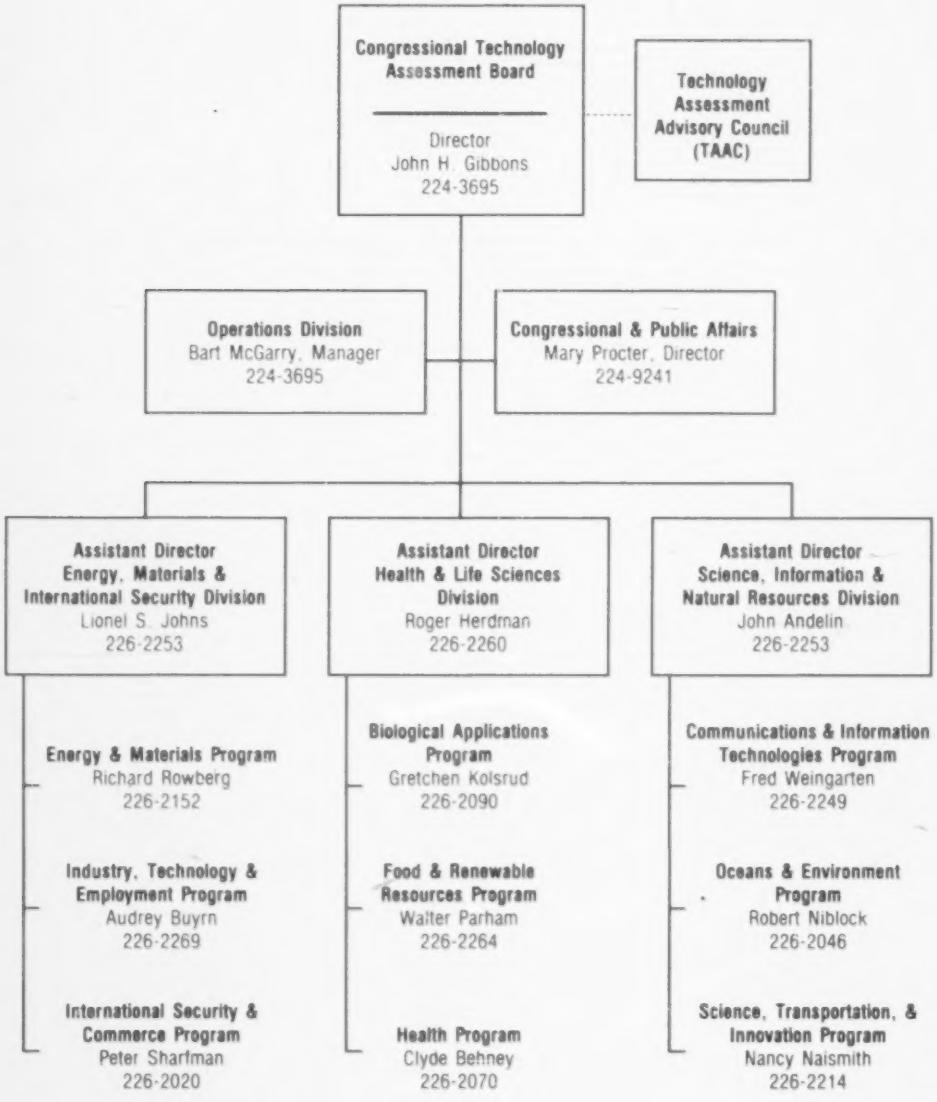

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